Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/canadianmachiner2125torouoft

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXI. No. 25. Publication Office: Toronto, June 19, 1919 Subscription Price $3.00 per Year

The Works behind the Label –

We never reach heights above our habitual thinking. It is the atmosphere we create for ourselves in thought that permeates and perfects what we do. The knowledge born of long experience that our product is the high speed steel par excellence fills the atmosphere of our plant with an ideal that every operative breathes." Red Cut *is* the best and, therefore, it ***shall*** be the best" is the driving force that makes

"Red Cut Superior"

LIBRARY JUN 16 1922 UNIVERSITY OF TORONTO

THE NATIONALLY KNOWN—FIRST QUALITY

HIGH SPEED STEEL

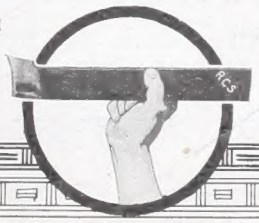
THE BEST FOR ALL MACHINE WORK

VANADIUM-ALLOYS STEEL CO.

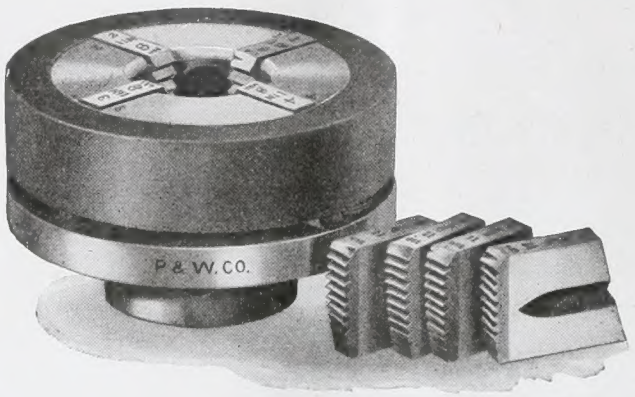
General Sales Offices: Pittsburgh, Pa. Works: Latrobe, Pa.

BRANCH OFFICES:

BUFFALO
BOSTON
CLEVELAND
CHICAGO
CINCINNATI
DETROIT
NEW YORK
PHILADELPHIA
PITTSBURGH
TORONTO
MONTREAL



SMALL TOOLS



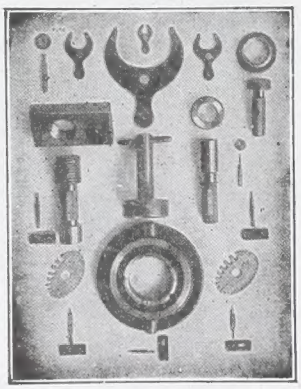
PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

P. & W. Die-Stock Dies

These dies are practically solid when in use and can be adjusted 1-32 in. larger or smaller. The chasers can be quickly removed for the purpose of renewal or sharpening. Standard sizes furnished include U. S. Standard, Whitworth Standard, S. A. E. Standard and "V" form, all right hand; also special right-hand Briggs Standard taper pipe thread.

The Pratt & Whitney policy of highest quality materials, together with the necessary refinement and accuracy, is maintained.



PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

PRATT & WHITNEY CO.
OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS

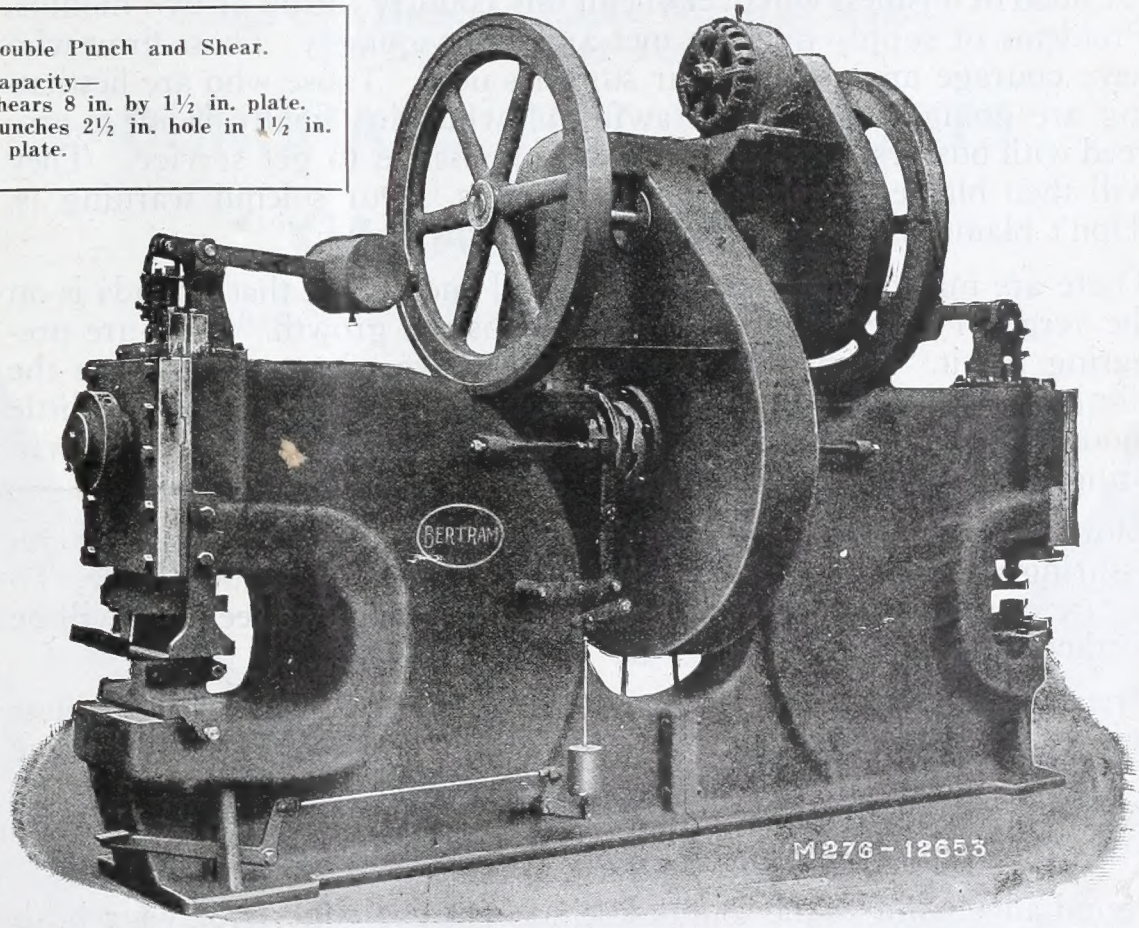
For Structural, Bridge and Shipbuilding Plants

Modern in design and built for heavy service, our line embraces a varied equipment of Punches, Shears, Bending and Straightening Rolls, Coping Machines, Rotary and Plate Planers.

The assistance and advice of our engineers are yours for the asking.

Double Punch and Shear.

Capacity—
Shears 8 in. by 1½ in. plate.
Punches 2½ in. hole in 1½ in. plate.



The John Bertram & Sons Co., Limited

DUNDAS, ONTARIO, CANADA

MONTREAL 723 Drummond Bldg. | TORONTO 1002 C.P.R. Bldg. | VANCOUVER 609 Bank of Ottawa Bldg. | WINNIPEG 1205 McArthur Bldg.

The Publisher's Page

TORONTO JUNE 19, 1919

A SOLEMN WARNING

"A SOLEMN WARNING" is the headline of an advertisement recently published in CANADIAN MACHINERY for one of the best-known of our Canadian manufacturers, the Canada Foundries and Forgings, Limited. The text of the advertisement follows:

"A flood of business will overwhelm this country inside of two months, Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hestitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, 'Don't blame us because you didn't see this vision.'"

There are many manufacturers who feel and realize that Canada is on the verge of a period of wonderful industrial growth. They are preparing for it. Surprising developments have taken place since the signing of the armistice. A little courage, a little vision, a little thought, a little co-operation, a lot of organizing and hard work will bring to this country a degree of prosperity scarcely dreamed of.

Lloyd Harris, head of the Canadian Trade Commission, brings a reassuring message as to the possibilities of developing export trade. To secure our share requires the prompt action which we feel sure will be forthcoming.

Preparedness is needed. Preparedness in the shop and preparedness in the office and in the field. We believe in it ourselves. We believe Canada and Canadian industry will grow and are building a large extension to our present building in anticipation of requiring additional room in a very short time.

Sound advertising is the soundest kind of preparedness for your business as well as the other fellow's. The advertising you do to-day will bear fruit in the months to come.

Canadian Machinery and Manufacturing News, June 19th, 1919. Vol. 21, No. 25. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.

Quality Service

THERE IS NO ARGUMENT

When you are assured

QUALITY SERVICE PRICE

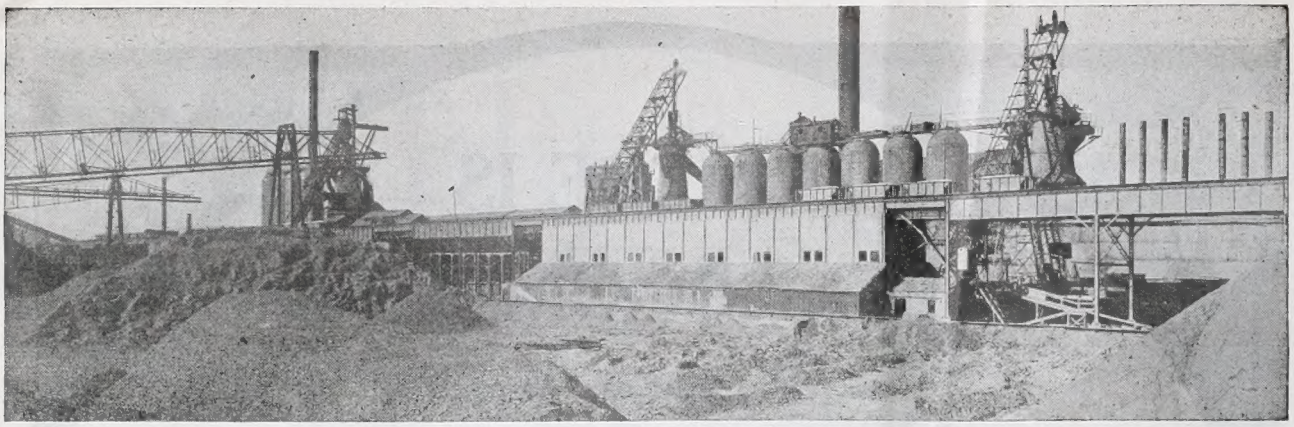
and One Hundred Cents Worth of Value
for Every Dollar You Spend

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar is Worth One Hundred Cents in Canada

THE STEEL COMPANY OF CANADA LIMITED

HAMILTON MONTREAL



Algoma Steel Corporation LIMITED

Sault Ste. Marie, Ontario.

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

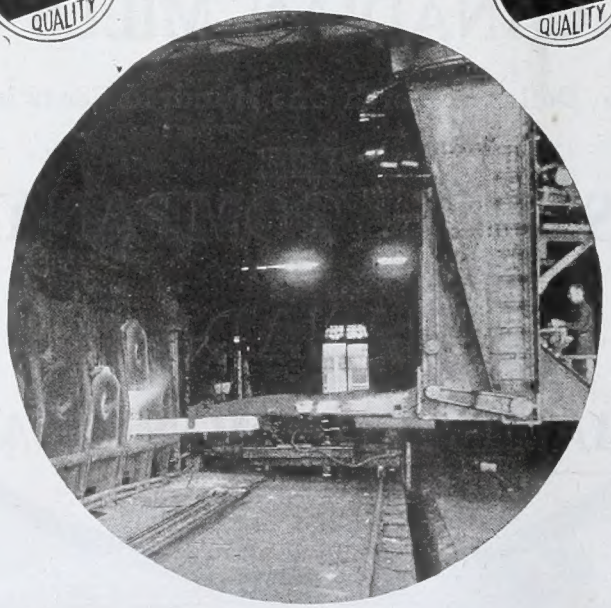
SPLICE BARS

STEEL TIE PLATES

PIG IRON
BASIC, FOUNDRY-BESSEMER

SULPHATE OF AMMONIA

MARK OF ALGOMA O.H. QUALITY

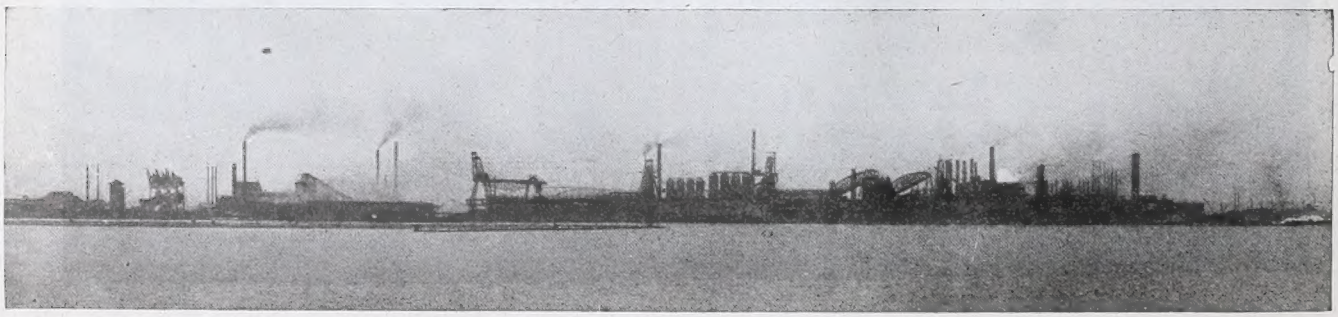


MARK OF ALGOMA O.H. QUALITY

BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake



GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

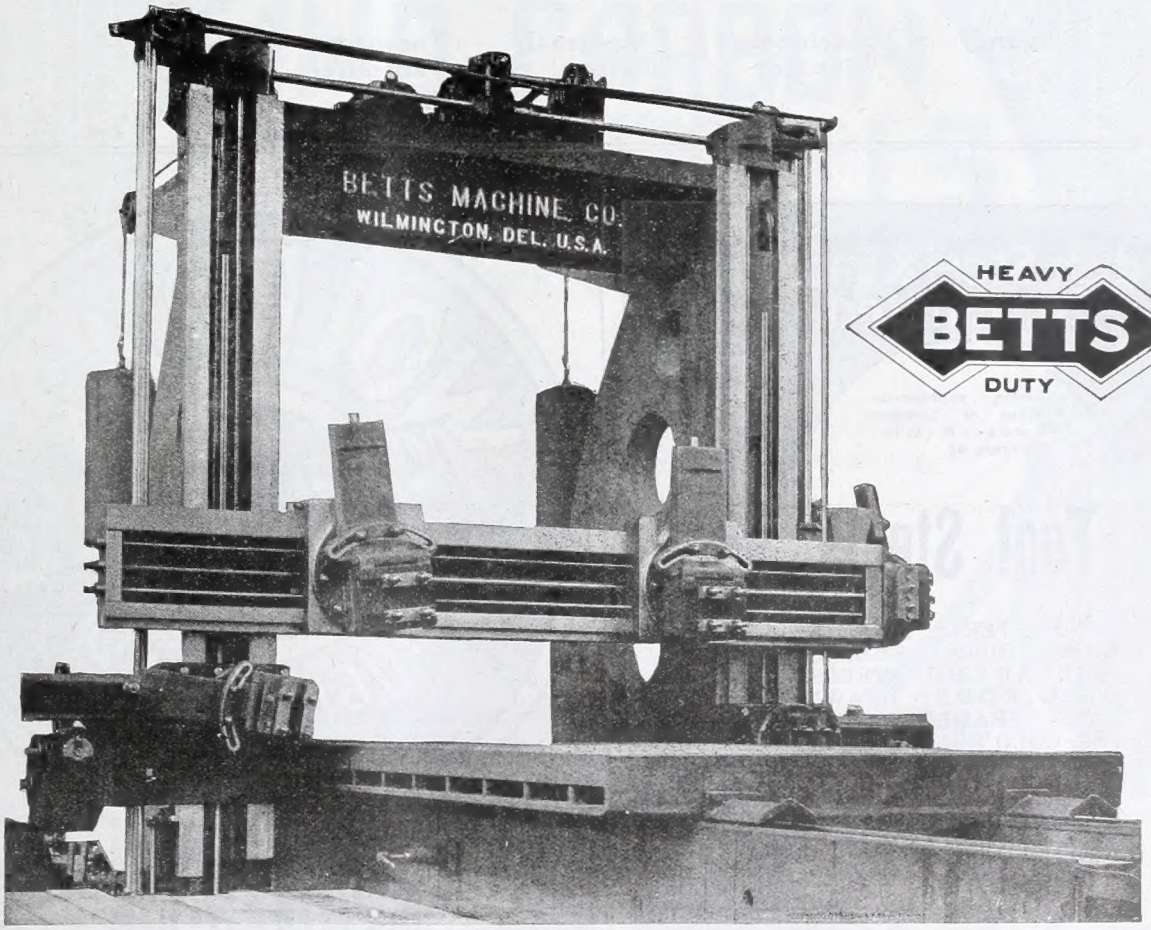
BETTS

Betts Leadership in Heavy Duty Machine Tools

In every commercial field there is a leader—a trail blazer—a pace setter. In the heavy duty machine tool field, Betts has earned the leadership. For 58 years Betts' tools have set the pace and blazed the trail to greater production and machine tool efficiency.

The number of tools in operation in the world's largest locomotive works, railroad shops, steel mills, shipyards, forge shops, electrical shops, etc., is convincing evidence of Betts' leadership in the heavy duty machine tool field.

Let us tell you more about Betts tools.



HEAVY BETTS DUTY

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON. DEL.

MODERN EQUIPMENT

For Mining and Industrial Plants

As successors to the Jenckes Machine Co., Limited, in the ownership and operation of the "Jenckes Plant," Sherbrooke, Que., we are continuing and extending their various lines of manufacture, such as: Pulp Mill Machinery, Hoisting Engines, Electric Hoists, Steel Plate and Structural Work, etc.

You will promptly receive interesting estimates if you will send us your specifications when in the market for new equipment or additions to present plant. Please address our nearest branch.

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS "DOUBLE ESS"

PROMPT SHIPMENTS from large stock

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO. Aliquippa ESTABLISHED 1900 Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company MONTREAL QUE.

Strong in the Neck

WILT

"Where there's a WILT—there's the Way"

HIGH SPEED AND CARBON TWIST DRILLS

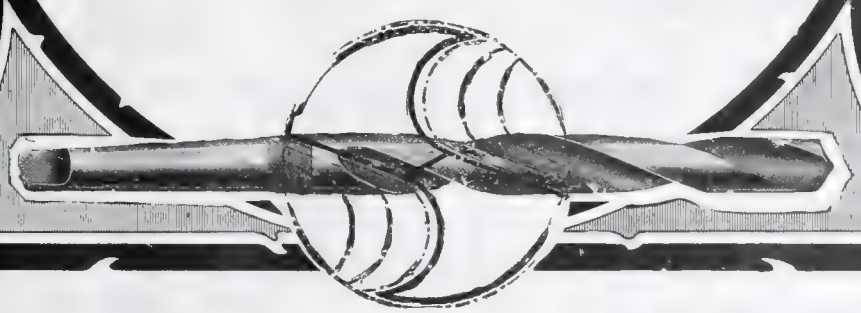
Unusual Drills Backed by Unusual Policies

Every superintendent should investigate the unusual qualities of

WILT TWIST DRILLS

The "WILT" has stood the test of all conditions—it is here to stay—its popularity among the mechanics makes that a certainty.

Investigate "WILT DRILLS" and you'll buy no others



WILT TWIST DRILL CO.
OF CANADA, LIMITED

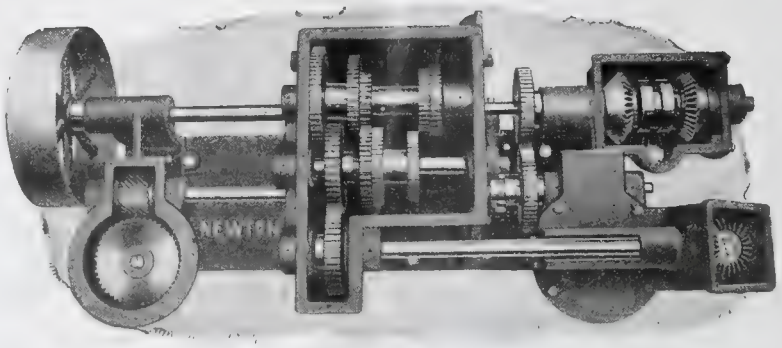
WALKERVILLE ∴ ∴ ∴ ∴ ONTARIO

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, E C. 2, London, England

THE JOHNSON FRICTION CLUTCH

OVER THERE

is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.



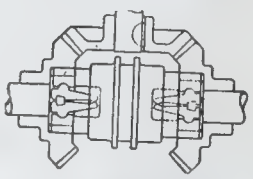
Courtesy of Newton Machine Tool Works, Philadelphia, Pa

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads., note the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are your requirements?

Our booklet, "Clutches as Applied in Machine Building," and Yellow Data Sheets are free.

AGENTS: CANADA—Williams & Wilson, 84 Inspector St., Montreal; The Canadian Fairbanks-Morse Co., Limited, Montreal and Branches. ENGLAND—The Efandem Co., Limited, 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA -Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth St., Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.



Double Clutch in Nest of Gears.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

E S & M

ELECTRIC

Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
WELLAND ONTARIO

G G

Forging Billets and Bars
Electric Furnace, Alloy Steels

Die Blocks
Annealed—Heat Treated

Piston Rods
Rough Turned—Annealed—Heat Treated

High Speed Steel

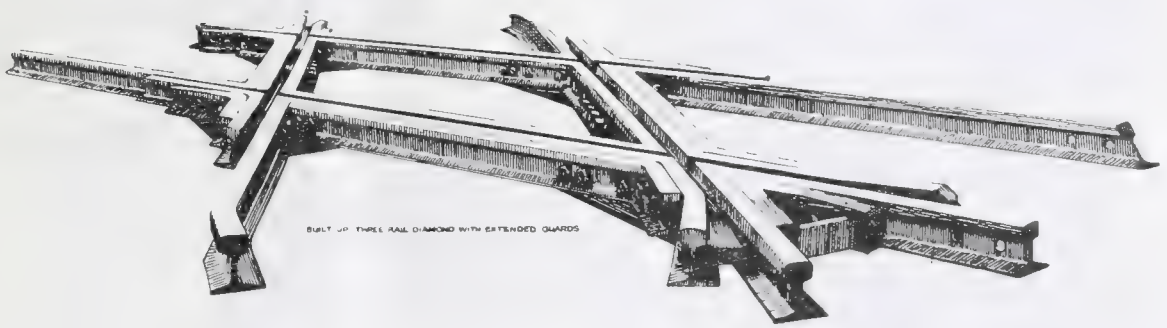
General Steel Company
Milwaukee, Wisconsin
DETROIT - 823 Dime Bank Building

TRACKWORK

OF ALL KINDS FOR STEAM AND ELECTRIC RAILWAYS

Built-up, Hard-Centre and Solid Manganese-Steel

Manufacturers of Balkwill Articulated Cast Manganese Crossings



BUILT UP THREE RAIL DIAMOND WITH EXTENDED GUARDS

CANADIAN STEEL FOUNDRIES LIMITED

Transportation Building, Montreal

H

Electrite

Electric furnaces, automatically regulated, the most modern methods, and the **introduction of Uranium** — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

High Speed Steel

Uranium

MacKINNON STEEL CO., LTD.

Engineers, Manufacturers and Erectors of Steel Structures

Industrial Bridges, Buildings, Towers, Smoke Flues and Stacks, Chutes, Coal Bins, Ore Bins, Tanks, Cranes, Engine Houses, Grain Elevators, Derricks.

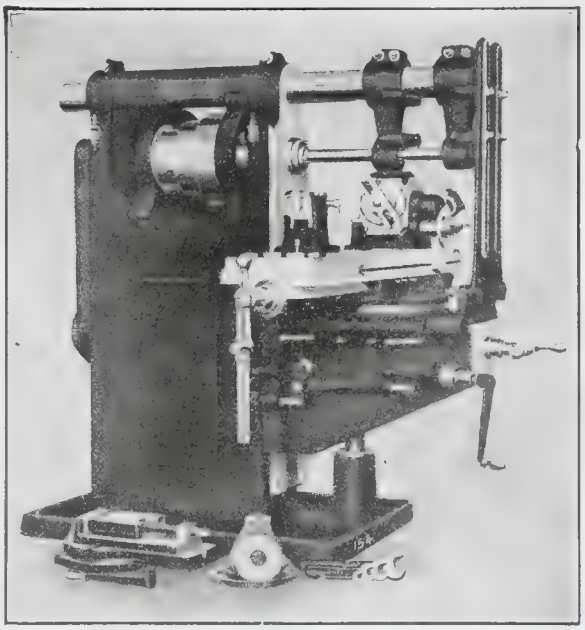
Structural Steel and Steel Plate Work, and a combination of the two lines.

Prompt Deliveries Assured.

MacKINNON STEEL CO., LIMITED

Sherbrooke, Quebec

Montreal Office: 404 New Birks Building



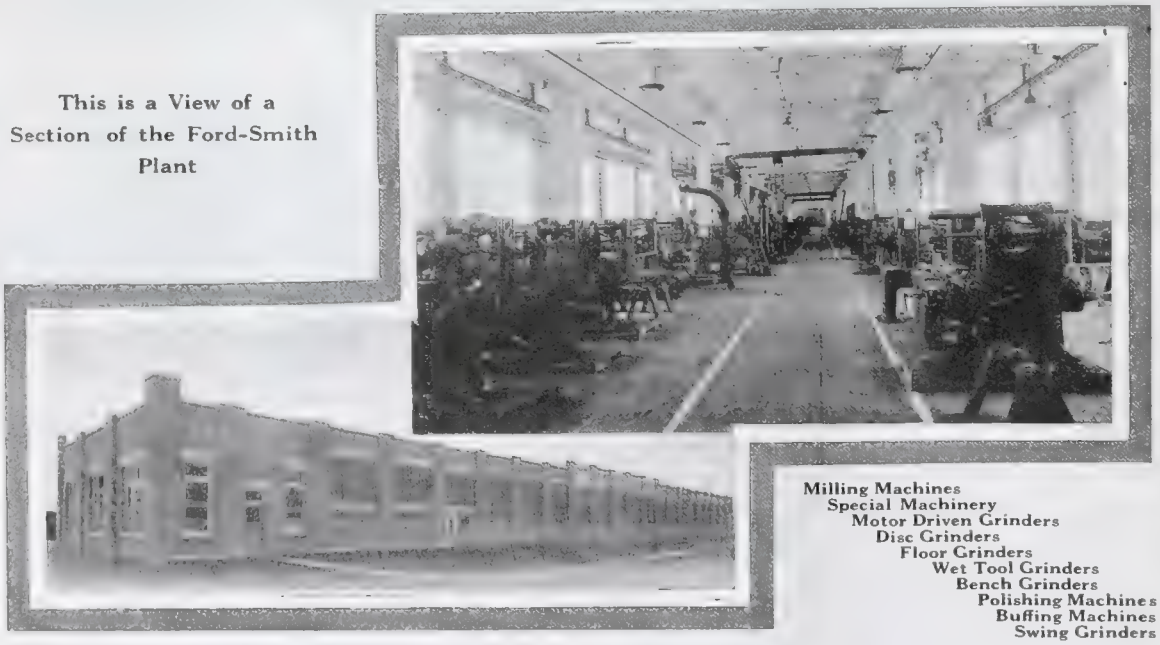
No. 2 Full Universal

FORD-SMITH MILLERS

WILL REDUCE YOUR MILLING COSTS

There are many other good points. *Ford-Smith Millers are great producers, easy to operate, accurate, and built entirely in accord with the high standards of construction that the* Ford-Smith Machine Co., Limited, has always maintained.

This is a View of a Section of the Ford-Smith Plant



Milling Machines
Special Machinery
Motor Driven Grinders
Disc Grinders
Floor Grinders
Wet Tool Grinders
Bench Grinders
Polishing Machines
Buffing Machines
Swing Grinders

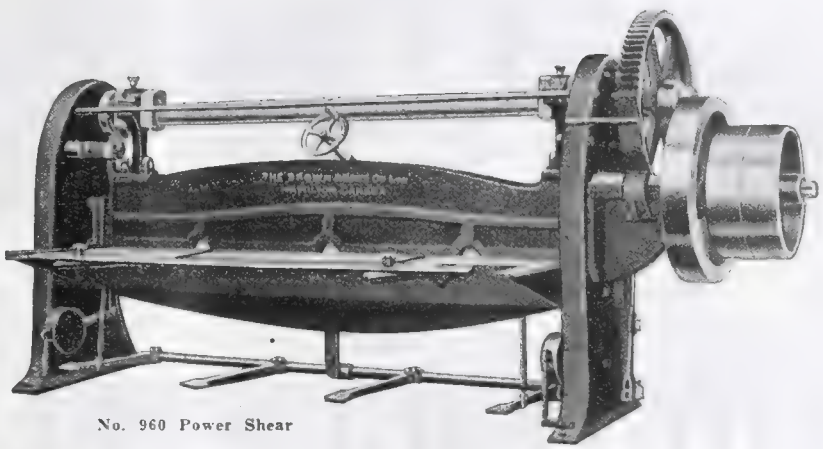
Manufactured in Canada by

THE FORD-SMITH MACHINE CO., Limited

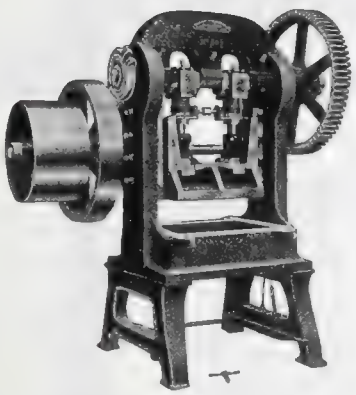
HAMILTON, CANADA

Foreign Agents: W. E. Storey, 3 Arundel St., LONDON, ENGLAND
Gollin & Co., MELBOURNE, AUSTRALIA

Stood The Test



No. 960 Power Shear



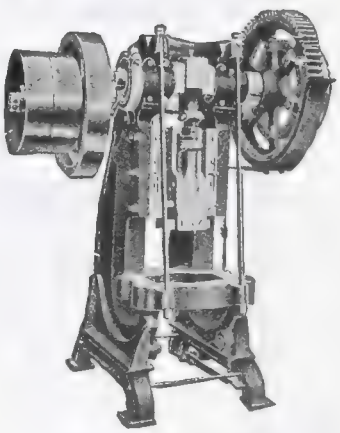
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

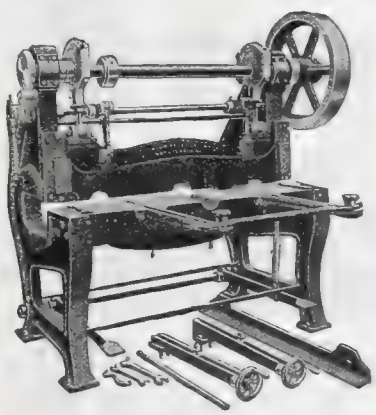
Inexperienced help and 24 hours' daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

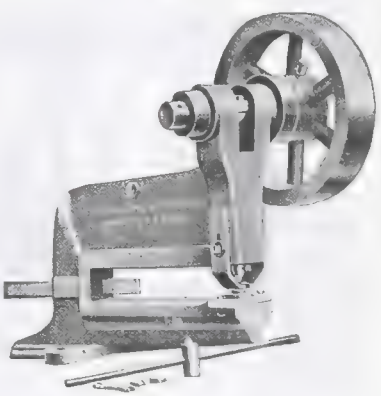
Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press



No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

BRITAIN'S BEST

KE

BRANDS OF ALLOY & TOOL STEELS

In Billets, Bars, Sheets, Hot and Cold Rolled Strips, Cold Drawn Cast Steel, Wire and Drill Rods

HIGH GRADE STEEL FOR ALL PURPOSES

KE KELOCK

Principal Trade Marks

KAYSER ELLISON & Co LTD

ESTABLISHED 1825 SHEFFIELD, ENG.

Complete Stock - Montreal Warehouse

RALPH B. NORTON

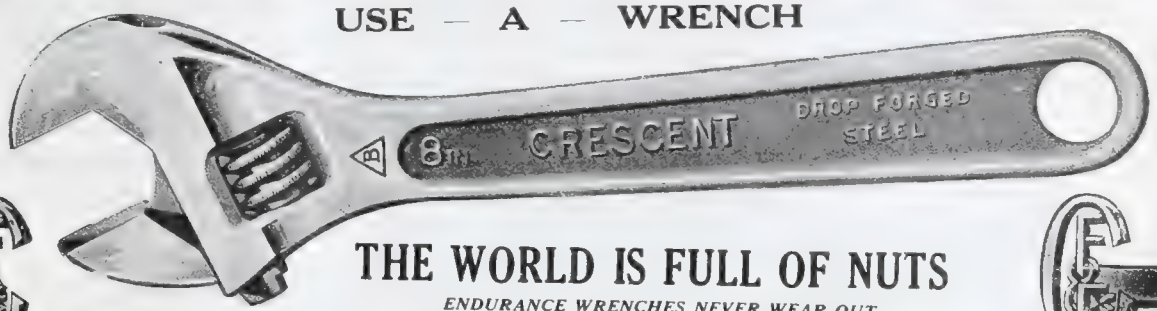
Agent

126 Craig St. West Montreal, Que.

CANADA
FOUNDRIES & FORGINGS
LIMITED

DON'T RATTLE

USE — A — WRENCH



THE WORLD IS FULL OF NUTS

ENDURANCE WRENCHES NEVER WEAR OUT

CANADIAN BILLINGS & SPENCER PLANT - Welland, Canada

Drill Steel Opportunity

25 Tons 1⅛" Cruciform Section Solid Drill Steel.

25 Tons 1¼" Cruciform Section Solid Drill Steel.

Will receive bids on lot or any portion. Above Steel for immediate delivery. Guaranteed quality.

ARMSTRONG WHITWORTH
OF CANADA, LIMITED

Head Office :
298-300 St. James Street, Montreal

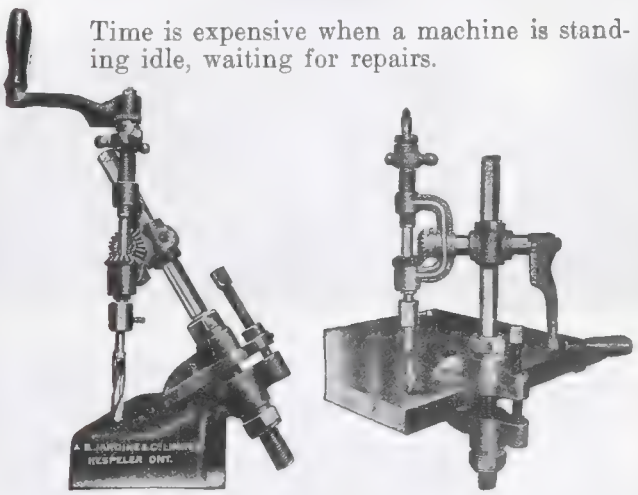
Works :
Longueuil, Que.

Branches :

126 Wellington St. W. TORONTO
27 King William St. HAMILTON
McArthur Building WINNIPEG

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



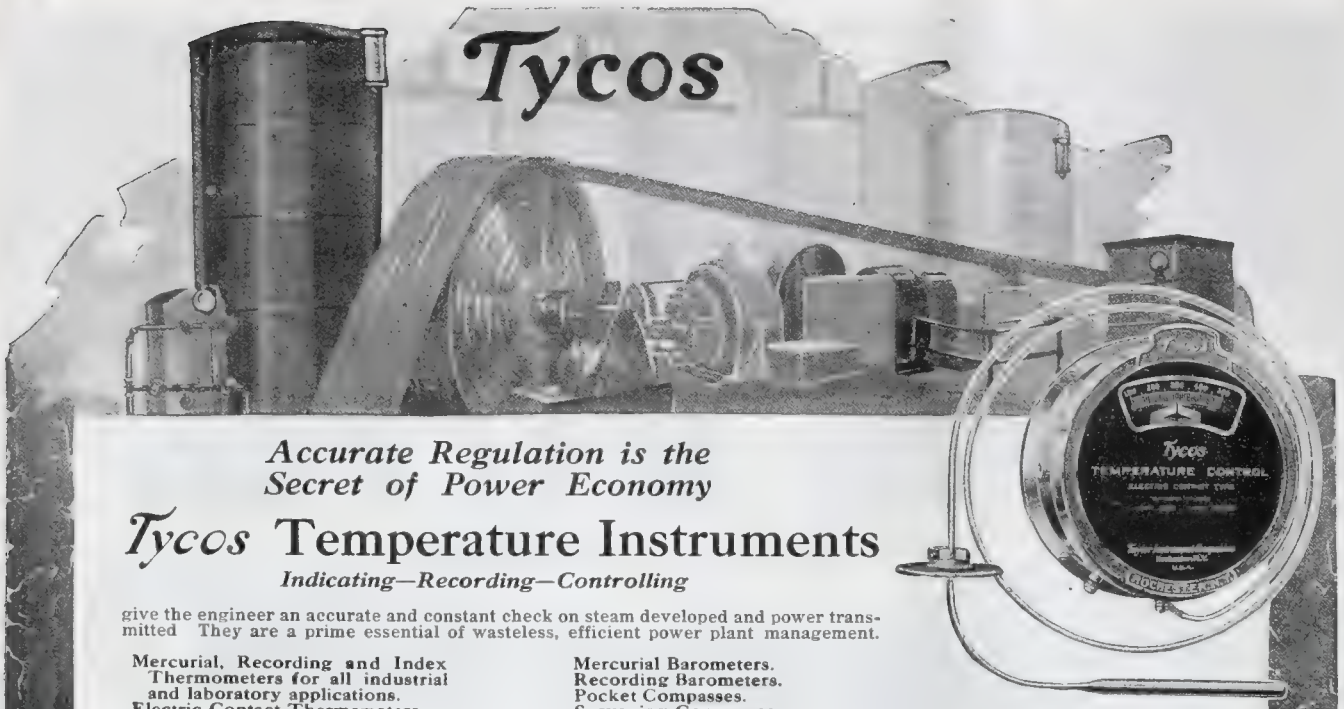
On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

Tycos



Accurate Regulation is the Secret of Power Economy

Tycos Temperature Instruments

Indicating—Recording—Controlling

give the engineer an accurate and constant check on steam developed and power transmitted They are a prime essential of wasteless, efficient power plant management.

Mercurial, Recording and Index Thermometers for all industrial and laboratory applications.
Electric Contact Thermometers.
Temperature, Pressure and Time Regulators.
Mercury Column Vacuum Pressure and U Gauges.
Base Metal, Rare Metal and Radiation Pyrometers.
Fery Radiation Pyrometers.
Hygrometers.
Hydrometers.
Mineral Oil Testing Instruments.
Aneroid Barometers.
Mercurial Barometers.
Recording Barometers.
Pocket Compasses.
Surveying Compasses.
Rain Gauges.
Anemometers.
Air Meters.
Thermographs.
Hand Levels
Aviation Barometers.
Inclinometers.
Sphygmomanometers.
Fever Thermometers.
Thermometers of all kinds for home and general use.

Tycos Singl-Duty Temperature Regulator

insures accurate automatic regulation. Air valve can be taken out for cleaning without disturbing dial

293

Taylor Instrument Companies Rochester, New York

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents:
CLEVELAND
Canadian Office:
904 C.P.R. Bldg., Toronto

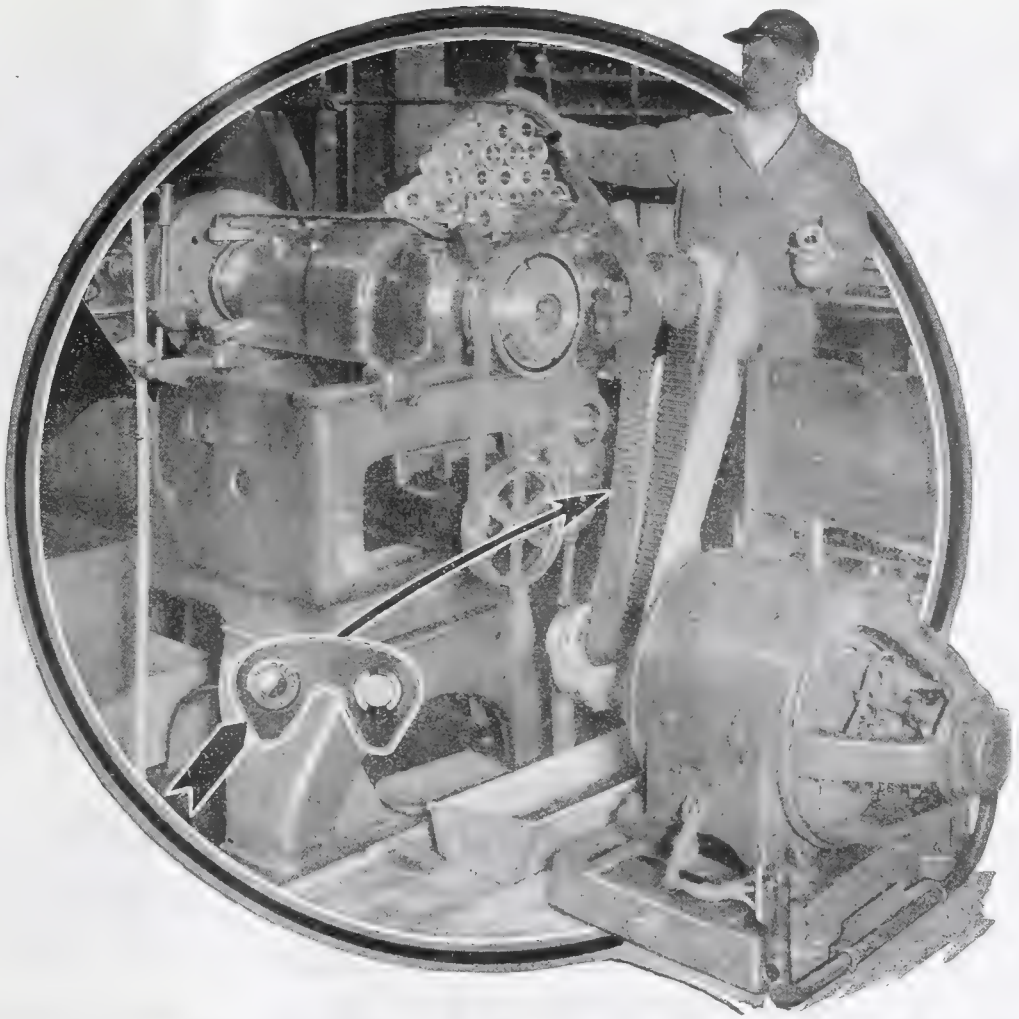
FIRTH'S Speedicut HIGH SPEED Steel

Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES: 449 St. Paul St. West, MONTREAL; 79 West Adelaide St., TORONTO
J. A. SHERWOOD, Canadian Manager



Silent Chain Drive Increased His Piece Rate Earnings 18%

THIS man is employed in one of America's leading manufacturing plants. He performs turret lathe operations on duplicate parts on a piece work basis.

Until recently his machine was belt driven. Now it is driven by Link-Belt Silent Chain. Since the change was made, his piece work earnings have increased 18%.

This increase was made on the same machine, same class of work, same operations, same hours, same everything as when belt drive was used.

His increased output is the direct result of the positive, non-slipping, smooth running effect of Link-Belt Silent Chain on the work in hand.

You, too, can increase the output of your plant, better your product and enable your piece work operators to enjoy greater returns by adopting Link-Belt Silent Chain Drive.

It is "flexible as a belt, positive as a gear, more efficient than either". Send for our Machine Tool Drive Book No. 312. Shows many applications and gives details.

CANADIAN LINK-BELT COMPANY
LIMITED
WELLINGTON AND PETER STS. - TORONTO

LINK-BELT
SILENT CHAIN DRIVES

We Also Make

- ☐ Elevators and Conveyors
- ☐ Link-Belt and Sprockets
- ☐ Silent Chain Drives
- ☐ Truck and Tractor Chains
- ☐ Electric Hoists
- ☐ Locomotive Cranes
- ☐ Wagon Loaders
- ☐ Coal and Ashes Systems

Write for Catalogs
Place X in Square

"WACO"

REGISTERED

"WACO"

TRADE MARKS

High Speed Steel

"Double Waco" Quality—for Quick Production Work.

"Turtle Brand"—High-class Tool Steels, Files and Drills.

Wortle Plates for Wire Drawers.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada:

MARSHALL, SON & BUNNEY

39 Richmond Street East - - - TORONTO, ONT.

HOYT METALS

"Frost King"
"Trojan"
"Nickle Genuine"
BABBITTS

Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.
Annual sales over $5,000,000.

Hoyt Metal Co., Toronto
New York, N.Y. London, Eng. St. Louis, Mo.

IMPERIAL GENUINE BABBITT METAL

The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

Say "W & B" Cotter Pins

Cotter Pins don't make up the big end of our business, but it's our business to make everything we make as well as it can be made.

That's our guarantee when you say "W & B" Cotter Pins in your order. We have them ready in all sizes or assortments. Also Flat Riveted Keys in sixty-nine sizes and patterns, and Flat Spring Keys in all sizes.

Send for new Spring Cotter List.

The Whitman & Barnes Manufacturing Co.
Office and Factory: St. Catharines, Ont.
London Office: 139 Queen Victoria St., E.C.

W&B
TRADE MARK REGISTERED

Established 65 Years
Whitman & Barnes
TWIST DRILLS — REAMERS — WRENCHES — HAMMERS

Cuts Costs ---*it is a Rockford Machine*
Increases Production

This powerful machine is made to drive high-speed drills up to 3″ diameter, for drilling and boring tools up to 8″ in diameter, for boring out cored holes in cast iron.

It has a lateral and vertical adjustment of the head that permits the spindle to operate anywhere on a surface 18″ high by 36″ wide.

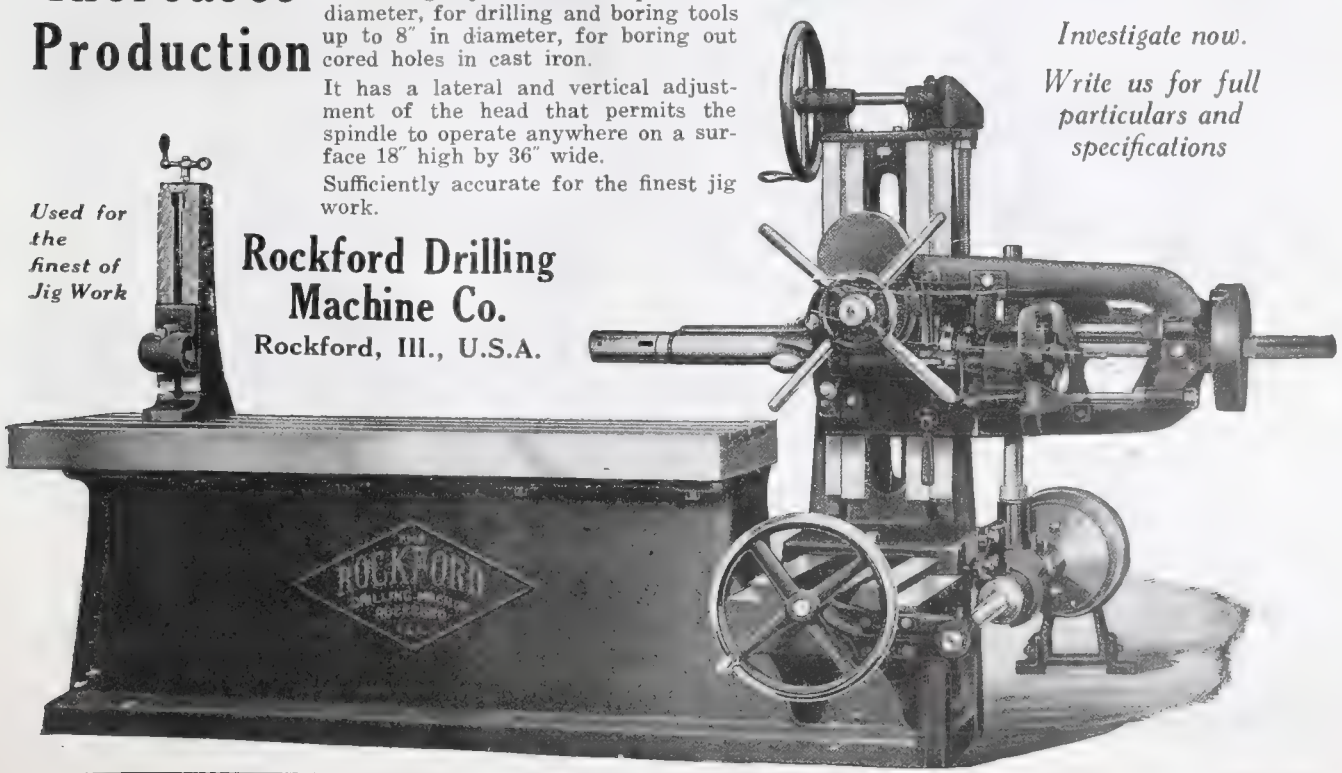
Sufficiently accurate for the finest jig work.

Investigate now.

Write us for full particulars and specifications

Used for the finest of Jig Work

Rockford Drilling Machine Co.
Rockford, Ill., U.S.A.



STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

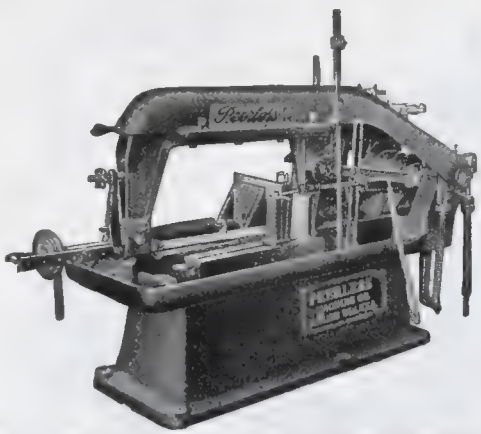
Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process

Peerless HIGH SPEED

The New Standard of Production

Why Not Cut Off Stock From 50 to 100% Faster?



Is there any reason why you should not profit by the superior speed, accuracy and capacity of the Peerless, as well as others? Why you should not do more work with the same number of machines, or the same work with fewer machines? Why you, also, should not save in room, in operating expense and in costly material?

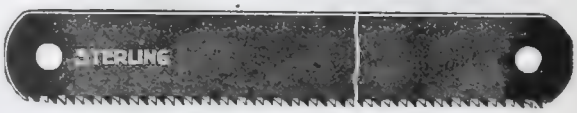
We will prove to you what the Peerless is doing in some of the largest plants in the country, or will let you prove its superiority in your own plant. A machine is ready for you to try, and if after 30 days' use you want to let it go, you may ship it back at our cost for freight both ways.

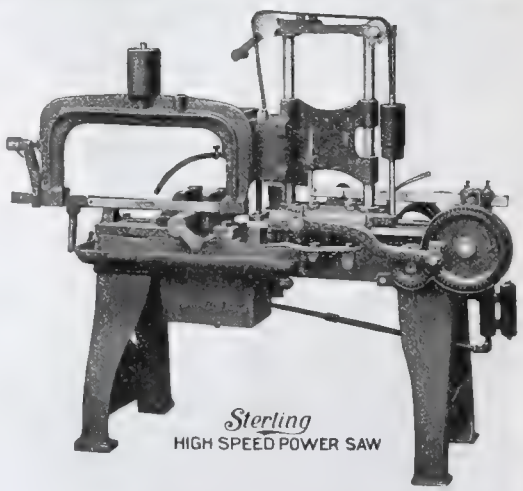
Write us about it—now.

PEERLESS MACHINE CO.
1607 RACINE STREET RACINE, WISCONSIN

"STERLING"

HACK SAWS

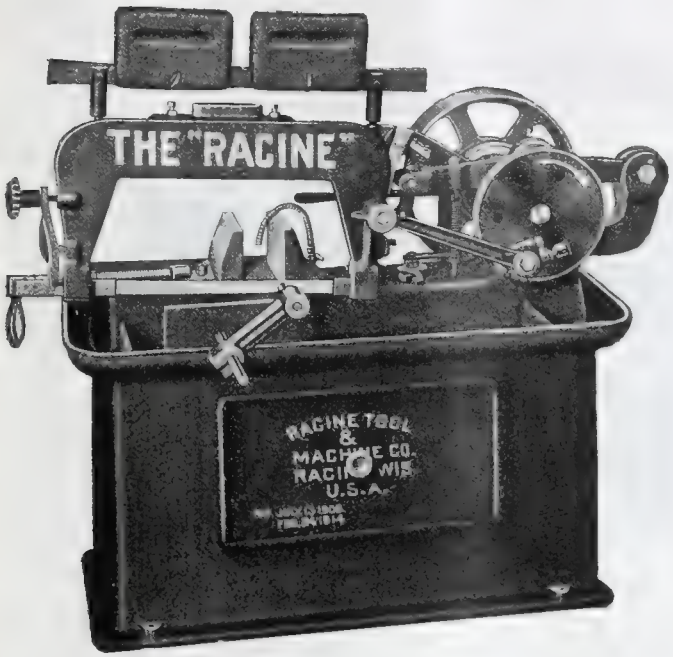




MANUFACTURED BY
DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A.

Standard the World over

"THE RACINE"



HIGH SPEED METAL CUTTING MACHINE

Reduces Blade Expense

Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

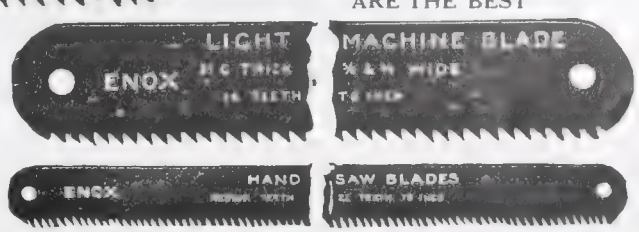
Use "Racine" H.S. Tungsten Power Blades

Racine Tool & Machine Co.
Melbourne Avenue - RACINE, WIS., U.S.A.

SIMONDS
HACK SAW BLADES
UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER

ENOX
Hacksaw Blades
ARE THE BEST



AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.

There is something more than just so many blades in a box of

Starrett Hack Saws

There is the Starrett reputation for quality of product. There's the ability to cut metal cheaper—and there's the feeling of confidence that Starrett trade-mark gives.

Catalog No. 21 will be sent free on request.

The L. S. Starrett Co.

The World's Greatest Toolmakers.
Manufacturers of Hack Saws Unexcelled.

Athol - Mass.

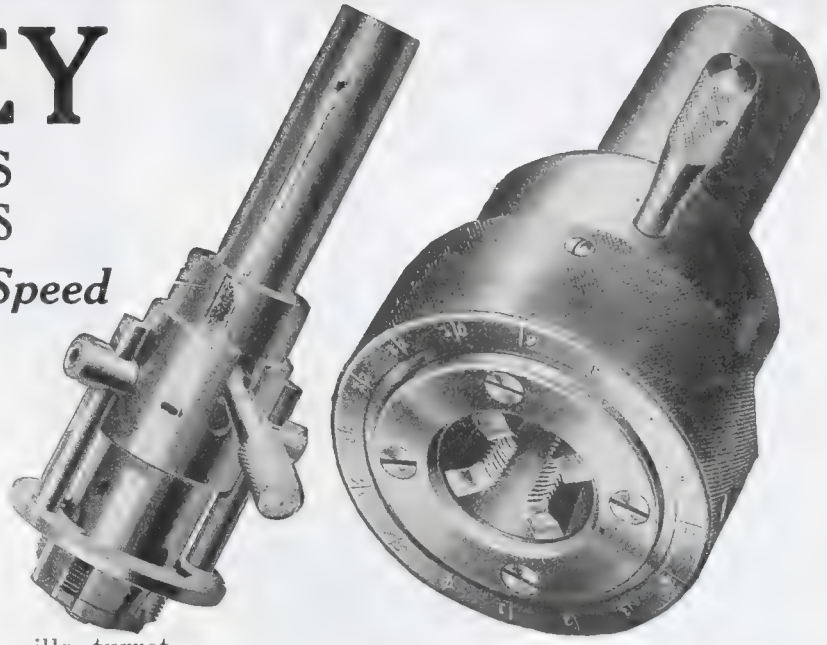
STARRETT HACK SAWS CUT QUICKER LAST LONGER

42-946

MURCHEY

COLLAPSING TAPS and SELF-OPENING DIES

Promote Accuracy and Speed



MURCHEY Collapsing Taps and Self-Opening Dies are cleared free from the thread instantly, preventing all danger of stripping, besides cutting time for production in half. **Thus you are sure of greater accuracy and greater production.** Murchey Tools are speeding production in all parts of the country on tapping machines, drill presses, monitor machines, boring mills, turret lathes, and all other machines to which taps or dies may be attached.

Let us know the class of work you are handling and we will show you how to increase your production 50 per cent. without running up the cost.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES & CO., 15 Rue Fenelon, Paris, France.

CUSHMAN

We've been Manufacturing

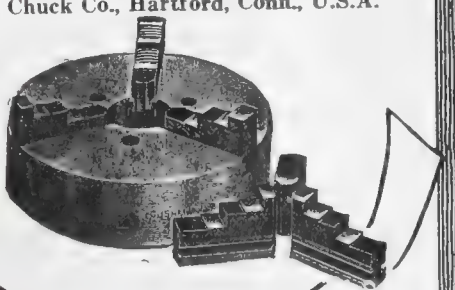
Nothing but Chucks and Their Accessories

FOR NEARLY 60 YEARS

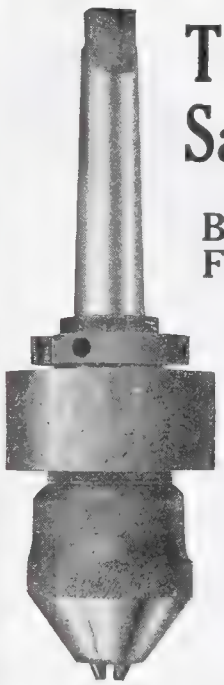
AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.
Cushman Chuck Co., Hartford, Conn., U.S.A.



Tap Chucks that Save Tap Costs



BICKNELL-THOMAS FRICTION CHUCKS

reduce tap breakage to the vanishing point. These chucks will hold the tap to the limit of its endurance, but a sudden strain sufficient to break the tap will cause the grip to loosen instantly. They are particularly adapted for tapping to the bottom of blind holes, for special work and—owing to their compact design — for use on multiple spindle machines.

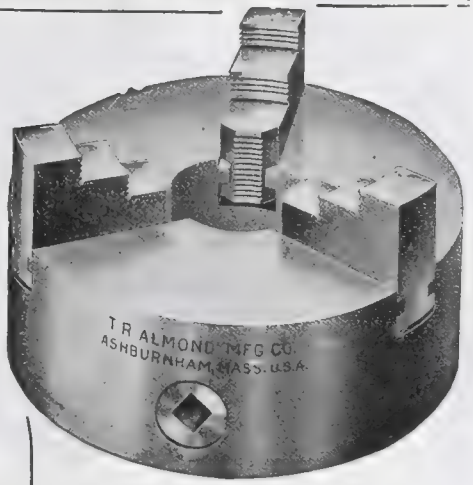
Made in four sizes—one-eighth to one inch. Straight or Morse taper shanks.

BICKNELL-THOMAS CO.

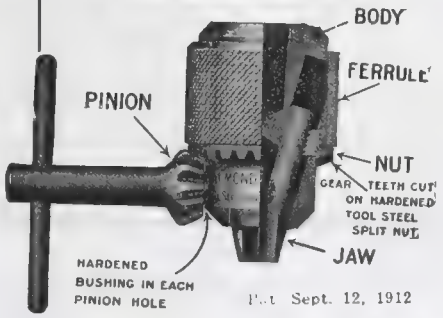
GREENFIELD, MASS, U. S. A.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5″, 6″, 7½″, 9″ and 12″.



Geared Nut Drill Chucks, in various capacities, 0″ to 1″.

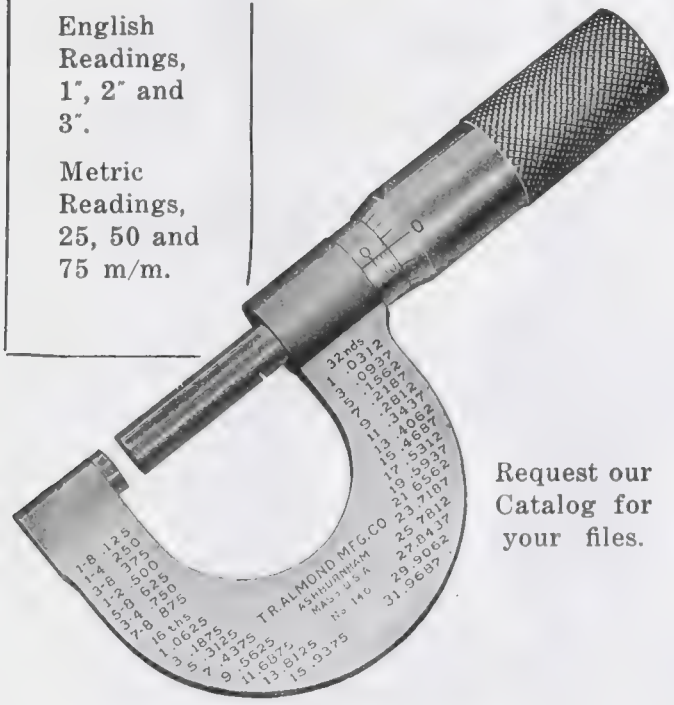


Pat. Sept. 12, 1912

Micrometer Calipers—

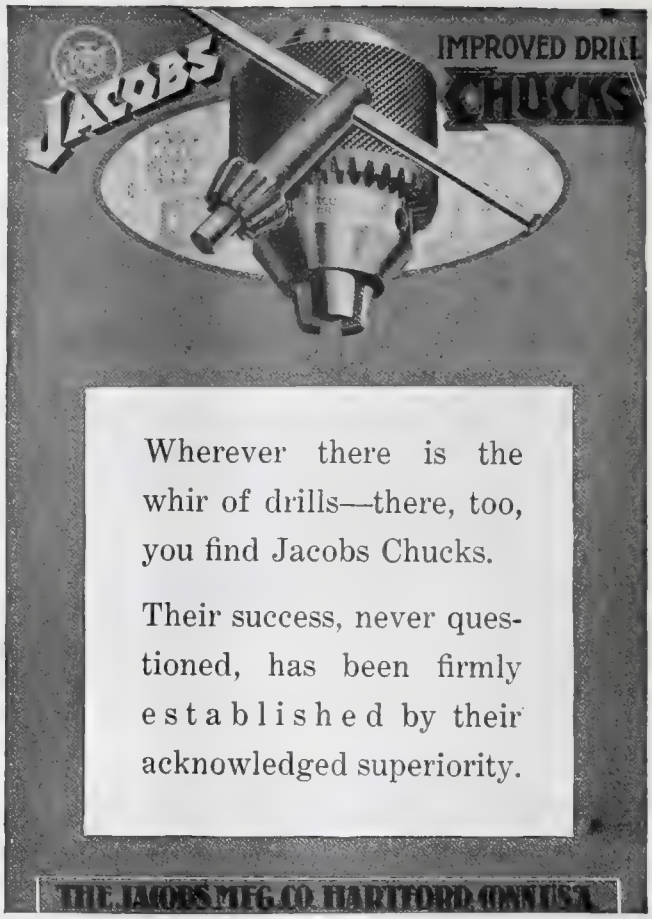
English Readings, 1″, 2″ and 3″.

Metric Readings, 25, 50 and 75 m/m.



Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.


JACOBS
IMPROVED DRILL
CHUCKS
Wherever there is the whir of drills—there, too, you find Jacobs Chucks.
Their success, never questioned, has been firmly established by their acknowledged superiority.
THE JACOBS MFG. CO. HARTFORD, CONN. U.S.A.

Look at this again —closely

and read what we have to say below

WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

STANDARD

SCREW MACHINE PRODUCT

SPECIAL

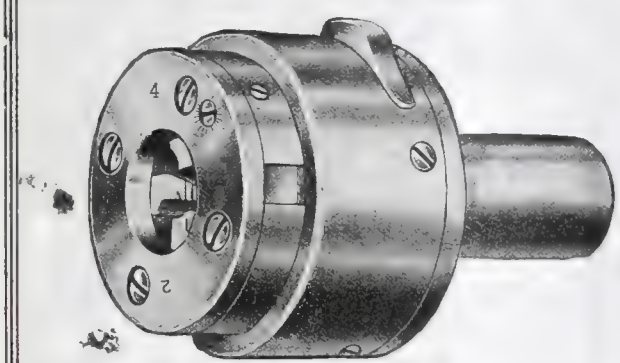
NUTS—
Plain—S.A.E.
Castellated—S.A.E.
Semi-finished—V—U.S.S.

SCREWS—
Cap—V—U.S.S—S.A.E.
Set—U.S.S.—V.

SPECIALS—made to customers' specifications up to 2¼" diameter, 10½" long.

THE NATIONAL ACME COMPANY

G.T.R. and DeCourcelles
MONTREAL, P.Q.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

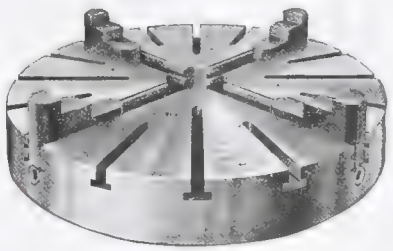
The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

GOOD MECHANICS
Show preference for the
UNION INDEPENDENT CHUCK



It has an iron body, and is made heavy and strong. The double bearing ribs for the jaws make a stiffer chuck for heavy work than the ordinary single rib type.

The screws are also of the "socket" type and operate in hardened steel thrusts, which also add to the strength and stiffness of a chuck that is designed for **heavy duty.**

The jaws are wide and the screws are correspondingly large.

UNION MANUFACTURING CO.
New Britain, Conn.
New York Office - - 26 Cortlandt St.
Makers of a Complete Line of Chucks

Williams' Superior Drop-Forged Wrenches

WHEREVER wrenches are used, particularly in exacting production requiring hard and continuous service, Williams' Wrenches are preferred.

Through constant and systematic effort, during nearly fifty years, to produce only the best, Williams' Drop-Forged Wrenches have been so developed that to-day their superiority is generally conceded. There's a strong, dependable Williams' Wrench, *Standard* in design and size, for every recognized trade need. Every one of the 40 patterns in about 1000 sizes, with openings from 3/16 to 7⅝", carries the Williams' guarantee of service.

Specify "Williams' Wrenches" and get superior quality. Copy of our Wrench Booklet on request.

J. H. Williams & Co.

"The Wrench People"

45 Richards Street, Brooklyn, New York

The A. G. Low Co., Ltd., 45 Pacific Ave., Saskatoon, Sask.
Agents for Manitoba, Saskatchewan, Alberta and British Columbia

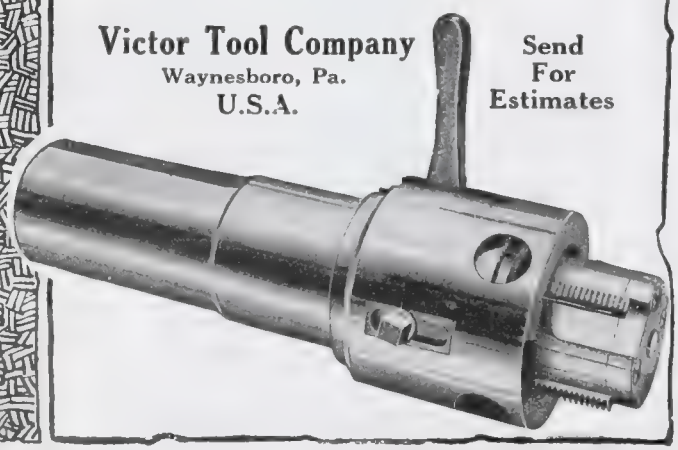
We wanted something original—this is what we got

"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
U.S.A.

Send For Estimates



DRILLS MORROW SCREWS MORROW FILES MORROW NUTS MORROW

MORROW
INGERSOLL

"Morrow" products are made by Canadian workmen in a fire-proof, up-to-the-minute, daylight plant — with Canadian capital—an all-Canadian institution producing the best

Set Screws
Cap Screws
Nuts
Twist Drills
made in Canada. The reliable kind. The jobbers carry them.

John Morrow Screw & Nut Co.
LIMITED
INGERSOLL - CANADA

Buy Ingersoll Files from us. "They cut faster and wear longer."

HEALD

Economy in Grinding Stationary Gas Engines

The John Lauson Mfg. Co., of New Holstein, Wis., at whose factory the above photograph was taken, makers of stationary gas engines, are convinced that the Heald No. 60 Cylinder Grinding Machine increases production and accuracy, while reducing the cost of manufacturing by grinding bores.

They have demonstrated that ground cylinders will cut the testing of running in time 50% or better and will produce a more desirable and economical engine.

In their catalogue they state that their cylinders and pistons are ground to size, which assures a smooth, round cylinder that will hold compression under all conditions, will last longer and deliver more power and require less lubricating oil than the bored type.

The above conditions are true not only with stationary engines, but also of every combustion engine, including automobiles, airplanes and tractors.

Write for Literature. Send samples or enquiries to our Service Department. We have eight engineers at your disposal

THE HEALD MACHINE COMPANY
Worcester Massachusetts

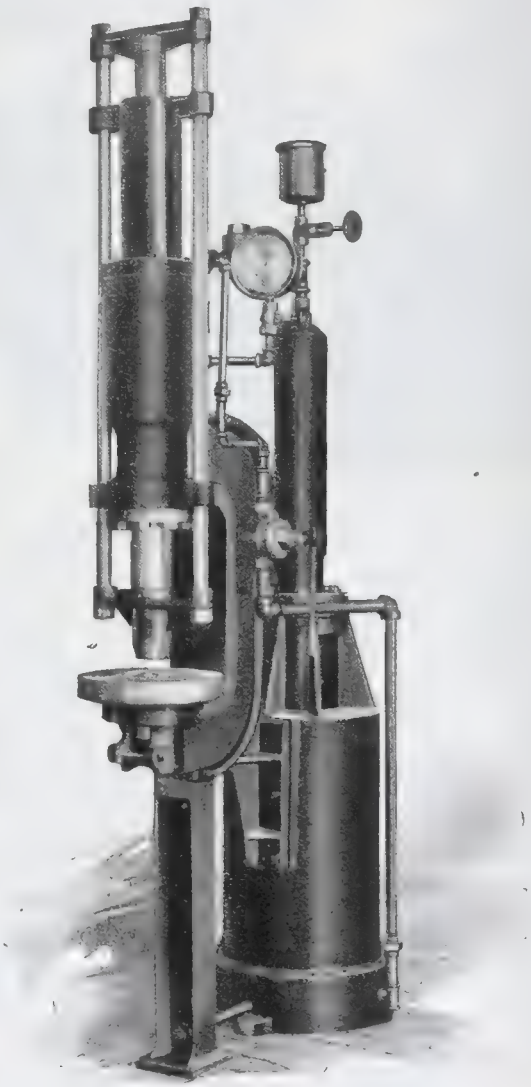
New York, 839 Singer Bldg. Philadelphia, 1408 Commonwealth Bldg. Chicago, 21 Jefferson St. Detroit, 911 Majestic Bldg. Cincinnati, 311 Provident Bank Bldg. Cleveland, 1102 Swetland Bldg. PACIFIC COAST AGENTS: Eccles & Smith, Los Angeles, San Francisco, and Portland.
FOREIGN AGENTS: Alfred Herbert, Ltd., England. Societe Anonyme, Alfred Herbert, France, Switzerland, Spain and Portugal. Societa Anonima Italiana, Alfred Herbert, Italy. Horne Co., Ltd., Japan. Wilh. Sonesson & Co., Sweden, Denmark and Norway.

ORIGINALITY

is Characteristic Always of

"METALWOOD"

DESIGNS and DEVELOPMENTS



The "Metalwood" line of these Quick Operating Hydro-Pneumatic Presses comprises a variety of styles, types and sizes.

By performance through a period of years, these presses have established themselves in a wide range of industries as standard tools for light straightening, broaching, forcing and assembly operations.

The "R-149" style press of 20-ton capacity shown here is described in our bulletin B-47.

METALWOOD MANUFACTURING CO.

High Speed Hydraulic and Hydro-Pneumatic Machinery

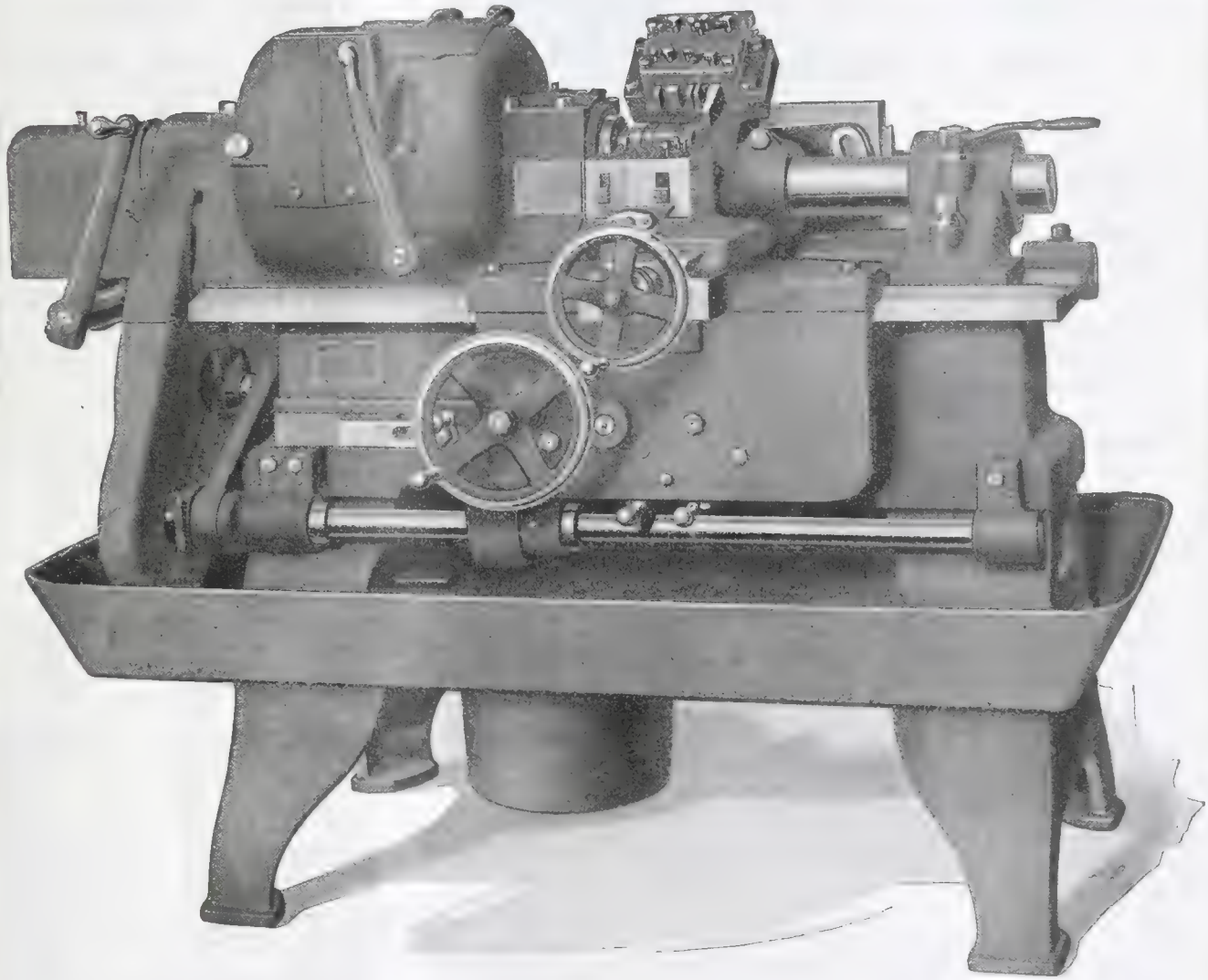
DETROIT, MICHIGAN

EXCLUSIVE SALES REPRESENTATIVES:

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

REED-PRENTICE COMPANY

WORCESTER MASS. U.S.A.



PISTON PRODUCTION

A REED-PRENTICE AUTOMATIC LATHE FINISH TURNING, GROOVING AND FACING A 3¾" PISTON IN ABOUT 2 MIN. 30 SEC.

THE PISTON HAS BEEN ROUGHED OUT ON A REED-PRENTICE AUTOMATIC OF THE SAME TYPE BUT WITH DIFFERENT TOOLING IN ABOUT 1 MIN. 35 SEC. BEFORE COMING TO THIS MACHINE.

MAY WE FIGURE ON YOUR WORK USING A SPECIALIZED MACHINE OF THIS TYPE?

CANADIAN FAIRBANKS-MORSE CO., LTD.
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES

Note On Grinding

NORTON COMPANY WORCESTER, MASS

No. 55A

Cylindrical Work In Die Grinding

In die grinding the cylindrical operations are almost entirely confined to the grinding of punches, both straight and tapered.

This is usually done on a universal or small cylindrical grinding machine and may be done wet or dry. When grinding wet be sure the stream of cooling water and lubricant is ample. If only a small trickle of water reaches the work, the cooling will be only local and will cause the metal to shrink at the point where it touches the work, causing checks and surface cracks by the unequal stresses set up within the steel.

For grinding steel punches, Alundum wheels of grain, sizes 36 to 60, and grades K, L and M, are doing the work very successfully.

If the punches are of high speed steel, the tendency should be toward slightly coarser and softer wheels. A hard wheel does not permit the cutting particles to break away fast enough for the wheel to cut cool and free, and when used on high speed alloy steels, the hard wheel will develop heat and burn the work. For this reason the slightly coarser and softer wheels give the best results on this type of work.

A grinding machine that is in first class condition will permit the use of a softer and faster cutting wheel and still give the same finish and wheel life as that obtained on an inferior machine using a harder, slower cutting wheel.

On necking and drawing die punches which are to be used for brass or other materials tending to load up, somewhat finer wheels are used to insure a good finish that will take a bright polish.

NORTON COMPANY

Canadian Agents—The Canadian Fairbanks Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B. Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. E. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS
NIAGARA FALLS N. Y. CHIPPAWA, ONT.

NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 111 NO JEFFERSON ST.

Skilled Artisans Prefer Standard Grade Tools

The skilled mechanic MUST have sharp files otherwise he gets no satisfaction out of his work.

As soon as his file becomes dull tell him to turn it in and get a new one. The result will be better work and greater satisfaction to all concerned.

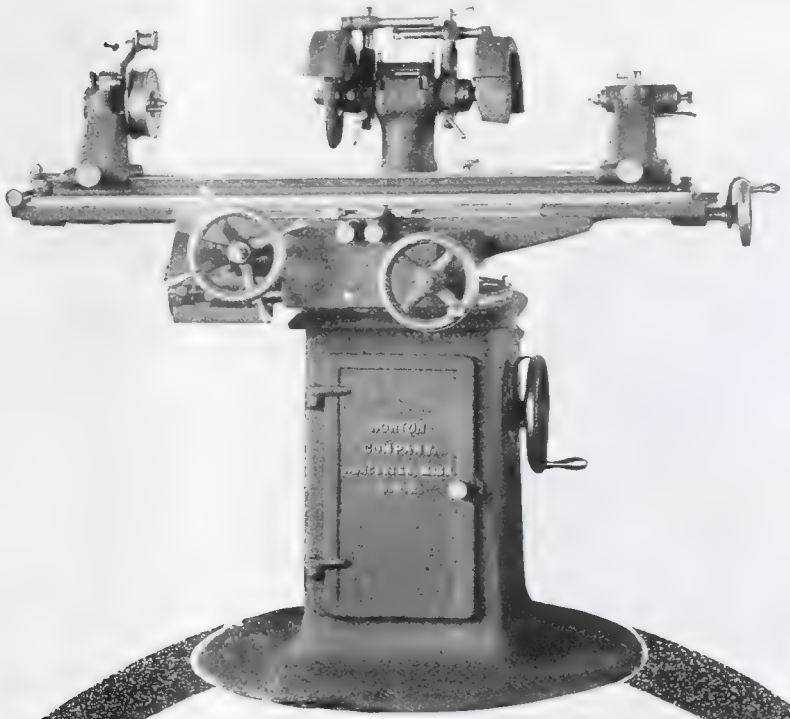
And it pays. New files cost little, labour costs much.

Good steel, accurate cutting and proper hardening insure long life to "Famous Five" files.

Specify them when ordering. They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by



NORTON

UNIVERSAL TOOL AND CUTTER

GRINDERS

You know these machines, so there's no need for a long-winded argument.

About all we wish to say here is that you can get IMMEDIATE DELIVERY on them.

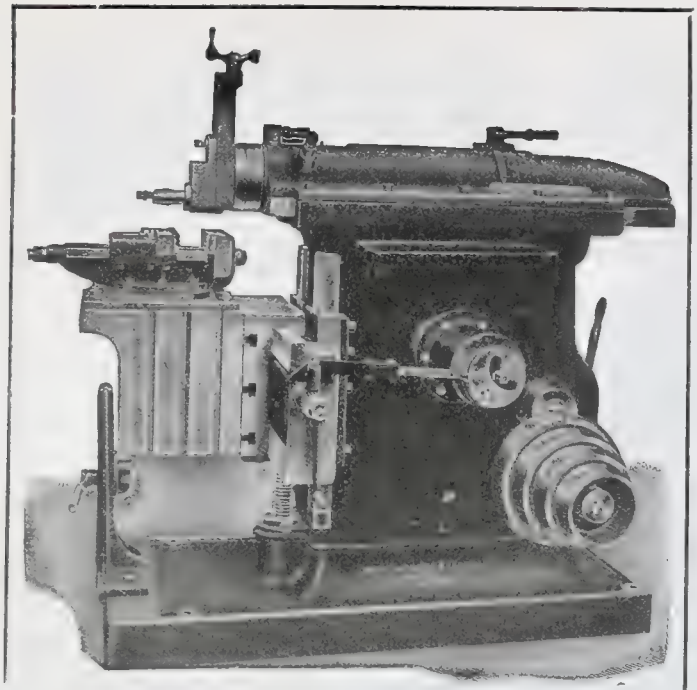
The Norton Universal, made in two sizes, No. 1 and No. 2, is specially adapted to tool room work.

How about putting one or more in your plant at once? Catalog T C-7 gives all the necessary information. Get in touch with us or our nearest agent the quickest way—by wire or telephone.

NORTON GRINDING CO.

Chicago Store, 11 N. Jefferson St. **Worcester, Mass.**

Vonnegut Machinery Company, Indianapolis, Ind. **Robinson, Cary & Sands Company,** St. Paul and Duluth, Minn. **Manning, Maxwell & Moore, Inc.,** St. Louis, Mo. **Henry Prentiss Co.,** New York, N.Y.; Boston, Mass.; Buffalo, N.Y.; Rochester, N.Y.; Syracuse, N.Y.; Scranton, Penn. **The Motch & Merryweather Machinery Company,** Cleveland, O.; Detroit, Mich.; Pittsburgh, Penn.; Cincinnati, O. **Eccles & Smith Company,** San Francisco, Calif.; Los Angeles, Calif.; Portland, Ore. **The Canadian Fairbanks-Morse Company, Ltd.,** Montreal, Que.; Toronto, Ont.; Vancouver, B.C. **C. T. Patterson Company, Ltd.,** New Orleans, La. **Kemp Machinery Company,** Baltimore, Md. **W. E. Shipley Machinery Company,** Philadelphia, Penn. **English Tool & Supply Company,** Kansas City, Md. **Alfred Herbert,** Coventry, England; Paris, France; Milan, Italy. **The F. W. Horne Company,** Tokio, Japan **Izanosskoff & Co.,** Petrograd, Moscow and Ekaterinburg, Russia



McDougall SHAPERS

Combine the best features of all machines which have hitherto been placed upon the market, and nothing has been included, except those points which experience has shown to be essential.

An examination of the construction will reveal features that make for increased production, ease of operation and accuracy.

Write for descriptive literature.

The R. McDougall Company Limited

Manufacturers

GALT, ONTARIO, CANADA

ARE-MAC-DEE IS A GUARANTEE

MARK YOUR PRODUCTS THE "MATTHEWS" WAY

"Matthews-made" steel stamps and lettering dies make easily read and durable marks on all classes of products. Matthews Champion Type Holders—for flat and convex surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years' experience.

Booklet "For Light and Heavy Marking" sent on request. Write for a copy of it.

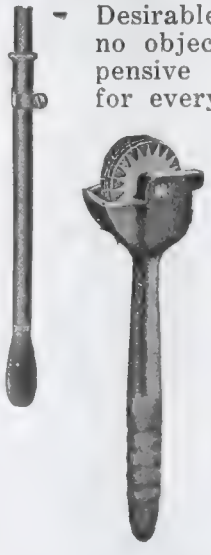
Canadian Fairbanks-Morse Co., Limited

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

Every Emery Wheel With Its Own Dresser



Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

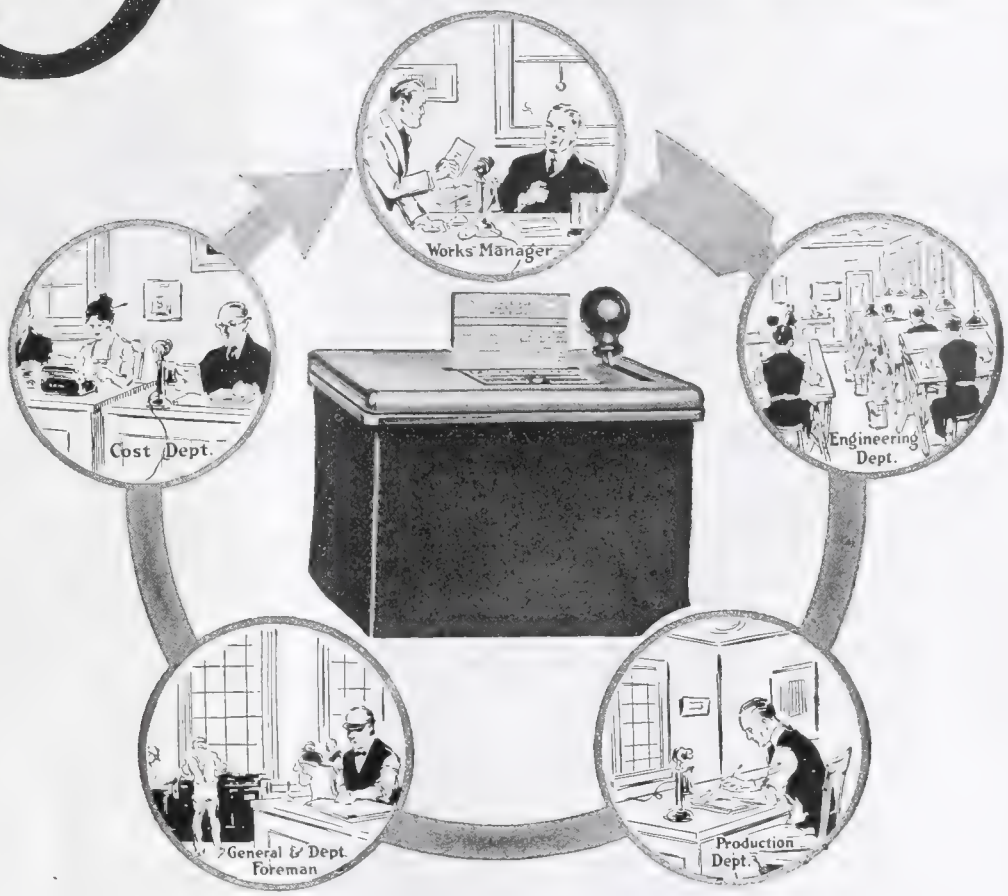
The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company

HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

GISHOLT



Efficient Factory Control Is Built Around the Periodograph

All departments benefit from the time the order comes to the works manager.

Periodograph time tickets help plan and route the work, report the correct time on each operation and give the facts from which accurate costs may be figured.

Gisholt Methods Insure Accuracy and Economy

Gisholt Methods Insure Accuracy and Economy

Get the full story

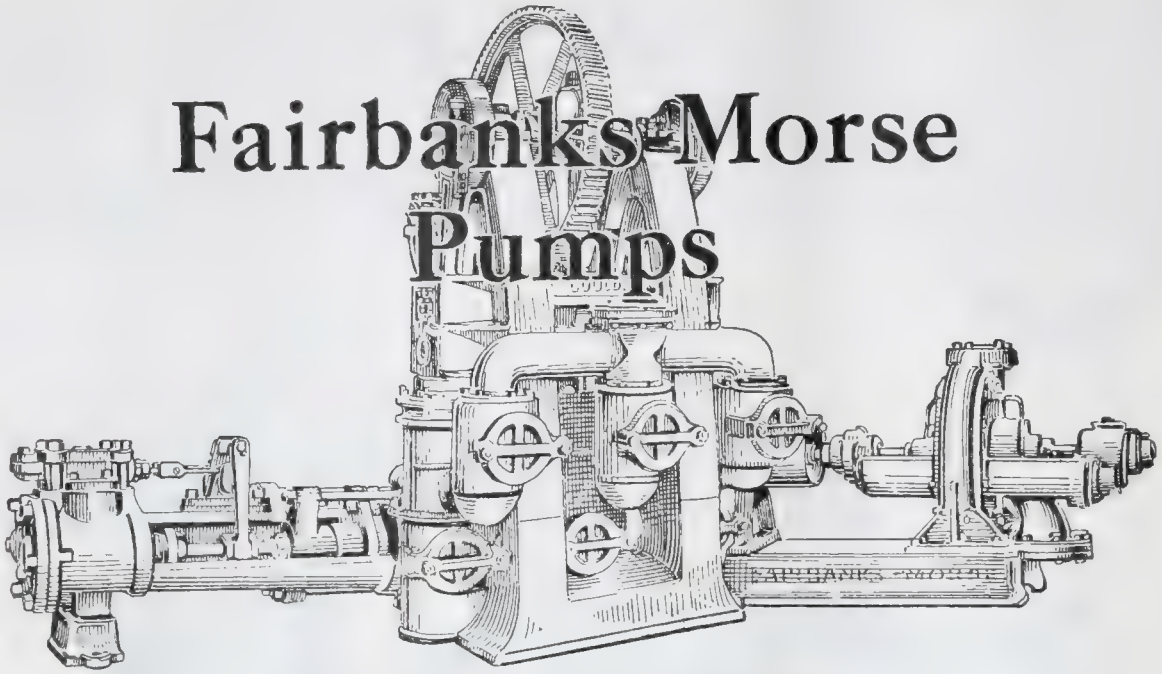
GISHOLT MACHINE CO., 1153 East Washington Ave. MADISON, WIS., U. S. A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery, etc.

Eastern Sales Office: 30 Church St., New York. *Works:* Madison, Wis., Warren, Pa.

Agent: F. A. Thomas Co., San Francisco, Calif.

Fairbanks-Morse Pumps



for every purpose

The same high standard and efficiency that characterize the Canadian Fairbanks-Morse engines and other mechanical equipment are found in each of the models of Fairbanks-Morse pumps.

No matter for what purpose you may desire a pump, there is a Fairbanks-Morse style to meet your requirements.

Enquire of the nearest Branch.

Canada's Departmental house for mechanical goods.

The Canadian Fairbanks-Morse Co., Limited

Halifax Quebec Montreal Ottawa
Toronto Hamilton Windsor Winnipeg
Saskatoon Calgary Victoria

CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 25. Toronto, June 19, 1919

Had Eight-Hour Working Day Twenty Years Ago

Why Fight Labor? That is the Question Put Forward by Sir Robert Hadfield, Head of the Great English Steel Concern—Greater Things in the World Than More Production

WHEN a man with the standing of Sir Robert Hadfield, chairman and managing director of Hadfield's, Ltd., speaks on the relations of capital and labor, it is certain that his audience is going to listen. Sir Robert does not speak as a theorist, but from years of actual experience; not as a man who has tried and failed, but as one who has succeeded; nor does his message bear the mark of a man who has fought strikes successfully or unsuccessfully, for he has beaten the strike before it ever arrived. His firm employs 15,000 men — they went through the war, and through the period of unrest following, as they have gone through preceding years—all without a strike.

Nor is the Hadfield a sweat shop, nor a long-hour proposition. Firms that are fighting the eight-hour day must appear as still in the dark ages to the Hadfields. Their works have had the eight-hour day for 20 years. It was a great big chance then to start the eight-hour plan in competition with all the long-hour shops of the world. A weak concern would have gone down and out. Hadfield's were—and are—a strong concern and they did not go down and out. Rather they went up and on.

The Hadfield process of casting steel ingots came to be well known in Canada during the period of the war. It was found to be thoroughly reliable and productive.

SIR ROBERT HADFIELD, Bart.

Chairman and Managing Director of Hadfield's Limited. The firm employes some 15,000 men, has had an eight-hour day for 20 years, and the works have been always free from strikes.

In an article from Sir Robert Hadfield, in "Factory," he gives his views on many matters. We moved a river out of its bed, he says, and made a new one for it, in order to enlarge the area of our works at Sheffield for the ever-increasing demands of war. Merely moving that river would have been an achievement of itself a few years ago; we did it as an incident to making munitions. We can do as much as that for the work of peace. If it is necessary to shift a social river in order to give a proper freedom for the adjustment of the relations of labor and capital—we can shift that river. For it is upon finding a better relation between labor and capital that the peace hangs.

I speak of labor and capital as though they were separate entities and as though it were inevitable that there should be labor and capital. I do not know that any such separation is ordained for all time and I rather suspect that a few years more may change something of that relation, but to-day it is the only one that we know and I am not at all convinced that anything can be gained by destroying capital—which is the ideal of Bolshevism. I think that we can gain more real ground by keeping the best of what we have and then endeavoring, with absolutely open minds, to find some way of bettering it.

To-day the relation between capital and labor is chaotic; the employer seems to be far

away (speaking generally and not specifically) from his employee and more or less the same condition holds in other countries, but the gap is not as wide as appears on first impression. The most radical—and not the average—worker speaks for the employee and the most backward or "conservative,"—and not the average—owner talks for the employers. Neither is representative of his class; the average worker does not wish to destroy the place in which he works and the average employer does not want to get the last drop of blood out of his employee. It is well to bear in mind that a reasonable adjustment will most certainly not satisfy the extremists of either class.

The basis of bad labor conditions is the delusion that long hours mean large production and that low wages mean cheap production. Therefore, the unthinking employer takes it that he can meet competition only by working men through long hours at low wages. And in to-day's cry for intensive production for peace as a solution for the problem of replacing the wastage of war, it is natural that hours and wages should come to the front.

How Higher Wages and Shorter Hours Can Lower Production Costs

I have demonstrated to myself that higher wages and shorter hours are aids to low cost production—if machinery can be brought in to help the worker. More than 20 years ago my firm established the 8-hour day and wages have increased several times, yet our output to-day per pound sterling of wages paid is greater than it was in the era of the 56-hour week when the men came to work in the dawn without their breakfasts. Having long ago reduced the hours per week, it would not personally be any great shock further to reduce them; it is a shock to go at one clip from 56 to 40 hours and that is the position of most manufacturing firms. Most of them are unprepared to cut the working week and maintain even a reasonable output. They think that in such a case they would not be able to meet competition—and probably they would not.

Therefore my suggestion is, that as preliminary to reaching a better basis, we get rid of one of the bogies of competition by taking hours of labor and minimum wages out of the discussion by equalizing them under an international agreement; and it seems to me that the prevailing idea about more production, if that means increasing the pressure upon the human unit, will have to be, to some extent, modified.

There is a personal limit to output; one of the strongest guarantees for future quiet would be to have some international understanding on this mad rush after more and more production; its present course can lead only to Bolshevism. No human being can really wish to see the level of output maintained at the war standard; flesh and blood could not stand such pressure. It seems to me that the present craving for very short hours is a natural reaction of the inhuman war pressure that prevailed during hostilities.

Such pressure is not now desirable; I do not at all mean that any of us—worker or employer—should do less than a proper day's work. We shall have to increase production to beyond the pre-war level. But that will come about in the natural course of events through the further development of the machine and without forcing the human being. We can use the mechanical element to accomplish that which the human element cannot. I ride in a motor car because it saves time; a century or so ago I might have been carried in a palanquin. My chauffeur is paid very much more per mile than the little bearers would have been and he has a much easier time; so do I. Is not that then the direction for industry to take?

Increased production will come; it cannot be helped. The requisite improvements in machines are inevitable and it will hasten those improvements if we could put an international prohibition upon the number of hours a man can do manual labor. To-day, many in England live in fear of the competition of America, of Japan, or of Germany; but each of those countries also lives in fear of British competition. Competition is good in its effects, but over-competition harms both the individual and the country and is quite as harmful as under-production. As regards this particular aspect of the subject I recommend readers of this article to see the interesting book by Bastable on "The Commerce of Nations." Although issued some time ago, it had a remarkable effect upon my own mind, showing that most of the great wars of the world had proceeded from trade rivalry, commencing originally in this respect between tribes, cities, guilds, small states, and finally modern powers. There is no doubt that at the bottom of the last great war there existed trade jealousy; Germany thought she was the Heaven-born country to take the world under her wing in trade matters, which of course was a ridiculous and far-fetched idea, as recent events have shown.

But the same story will be repeated unless we learn the lesson indicated in this article, namely, the stupendous necessity—I use the word advisedly—of the leading nations of the world now coming to an understanding upon

what are termed trade matters. The same jealousy will spring up as in the past and we shall have the old cries of "Free Trade," "Tariff Reform," "Protection," "Fiscal Reform," "Commercial Treaties," and the like, but none of these will settle the difficulty unless a genuine attempt is made to try and unify the trade conditions of the world as a whole, at any rate regarding Europe, America, and certainly some parts of the Far East. Now is the time to make this effort when the nations of the world have been brought together in a manner which has never before been possible.

I commend this phase of thought most earnestly to the readers of this article, feeling sure that if some arrangement could be arrived at, even small as it might be in the first instance, this is the only possible solution of the world's difficulties with regard to interchange of the productive capacities of different countries. My country tried to set an example in the establishment of free trade. We in many respects unselfishly threw open our markets to the world; we did our best, but other countries did not respond. On the other hand, it can be truthfully said that we did more than any other country. However, in the future it is more than probable that we cannot take the same line of policy unless there is response not only from our Anglo-Saxon relatives, but from other countries too. Here again the world conference now assembled at Paris must face this situation if the peace of the world is to be assured for future generations.

Is is my view that the talk of competition and of consequent trade wars has done much to bring about the present disturbed conditions. A workable internationalism might start with equalizing, at least to the extent of hours and minimum wages, world-wide industrial conditions. Of course the process would not be quite as simple as it sounds, but I can see no insurmountable obstacles. An international basis of industrial output and development is feasible, if only the will to bring it about is present.

If we could thus dispose of hours and at least minimum wages we should also dispose of that employer who is always striving to hold back the employer with advanced ideas. There are backward and misguided owners who imagine that conditions should not be changed and who use all of their powers of boycott and intimidation to restrain the owner who thinks differently from them. There are workers who adopt a similar policy. Much unfair opposition was met with when my firm started the 8-hour day. Had we not been possessed of ample financial resources our plans would have been wrecked simply because we wanted to give the worker a better chance. A firm financially weaker would have had to give up the experiment.

Because of this kind of attitude, trade unions came into being and, as a reply to them, came employers' associations; their respective functions are quite alike—for the one to get the better of the other. There is no thought of mutuality. The two bodies make treaties with each other as though they were enemy countries and then set up elaborate and cumbersome mechanisms for the settlement of the disputes which are certain to arise out of the agreements. Disputes which might be settled on the spot in 10 minutes, drag through weeks of meetings by district and national bodies. Little differences soon become important, even national affairs. For instance, the 47-hour week in manufacturing is threatening to split on such a trivial adjustment as when the men shall start work and whether or not there shall be a break in the morning for breakfast. Just the other day I

EQUAL RIGHTS TO ALL—MY LABOR POLICY

YOU must give confidence to all classes, confidence to those who have brains, to those who have capital, and to those with hearts and hands to work. I say to labor, you shall have justice; you shall have fair treatment, a fair share of the amenities of life, and your children shall have equal opportunities with the children of the rich. To capital I say: You shall not be plundered or penalized; do your duty by those who work for you, and the future is free for all the enterprise or audacity you can give us. But there must be an equal justice. Labor must have happiness in its heart. We'll put up with no sweating. Labor is to have its reward. And when the whole nation sees that wealth lies in production, that production can be enormously increased, with higher wages and shorter hours, and when the classes feel confidence in each other and trust each other, there will be abundance to requite the toil and to gladden the hearts of all. We can change the whole face of existence.

DAVID LLOYD GEORGE

discovered that many of our men were quite disturbed by a rule against smoking while at work; they wanted to have a pipe during the morning. We have always permitted smoking on night work but, for no particularly good reason, smoking has not been allowed during the day.

Arrangements which tend to more and more formal relations may not be the best, as in the case of joint industrial councils as projected in the Whiteley Report. Insofar as the shop committees are concerned the plan is good. I take it as fundamental that there must be some machinery for a mutual exchange of view between the employer and employee in any large establishment. We have often had such committees and our people have been able to appeal to a common forum. I am glad to say we have never had a strike—which is, unfortunately, somewhat a rare record.

I hope that it will be possible by mutual arrangement and through the higher standard of life that high war wages have given to the what might be called the "intellect" of industry, and instead of having the employer directing with knowledge and the employee merely working and without knowledge, that the worker will appreciate the scientific and financial problems of industry and become a co-worker. What we need is a higher level of intelligence in the worker rather than more production; given that intelligence the production will take care of itself. And so also will the cost of production.

What Sir Robert Thinks About Welfare Work

Those of us who are employers should make up our minds to face the future as something which will not only change the present working relation, but will change it for the better. For the worker has not had a full chance to develop and it is not good for society that one class should have infinitely greater opportunities than another. The way to development is not through paternal attention in the direction of welfare work.

Proper welfare work may be necessary in the case of those who have not even the comprehension that there is a better way of living and so cannot realize their freedom; but welfare work is really only a part of an education and not an end in itself. The providing of good houses and a decent place in which to work is not welfare work, but a primary duty of the employer if the local housing conditions are bad. The real point is to give the worker the money and the leisure for his own development.

Let me quote a passage from an address by Harold Cox, because he exactly expresses the thought that I have in mind:

"First of all, why have the masses of our people so long been condemned to live in poky houses and mean streets, many of them with insufficient food? You answer that it is the result of low wages. I ask again: Was it necessary that the wages should be so low? The reply obviously is that the work was worth so little, or in other words, the worker produced so little. But was it necessary that the worker should produce so little?

"Cannot we on the one hand secure universal employment, and on the other widespread enjoyment? If our people permanently insist upon a higher standard of living for themselves, their own demands for comforts and luxuries, either of home manufacture or of foreign importation, will create employment for themselves either in home or export industries. Reciprocally, if we utilize for the purpose of peace the tremendous productive power which the war has shown we possess, we can secure for our whole population a richer, a fuller, and a happier life."

We have heard much during the war about the working people buying pianos and indulging in other expenditures which are called luxuries. Why should not a worker have a piano? Why should anyone cavil at anything a worker buys? Is it not a good sign that he is interested in these things? Is he not a human being?

But it seems to be the fashion to talk as though the worker were not a human being and that he would not appreciate conveniences, even luxuries, if he had them. Take for instance some dwellings that I put up in Sheffield twenty-five years ago. They were not elaborate, but they were decent and they had in them bathtubs and other accommodations. The bathtubs annoyed many of my friends; they revived the old story about tubs being used for coal or vegetables or for practically any other purpose other than bathing.

What actually happened? The people not only used the tubs but their friends came to indulge in the luxury of a hot bath at home in their own home.

But all of these things—these aids to better living—are but incidents; the end is a much larger affair. That end is the mental and physical equipment if possible of this generation of workers and certainly of the next, to enable them to take a larger place in the scheme of life.

To this end I would advocate almost any reasonable change that would improve the condition of the man who honorably works with his

hands. I think that he should have the same advantages as the brain worker and be raised to his standing. Why should not the manual worker have a vacation with pay? He would be the better for having a respite from the business of earning a living—just as all of us are. I want to see generally introduced the paid vacation time, not as a magnanimous act, but as a help to efficiency.

Many of these questions are international and I think that England and America as representative of the Anglo-Saxon race could not do better than join together in the work. We have combined for the war and with extraordinary efficiency. Why should we not extend that principle? Why should not wages in England be as good as wages in America and the hours of working just the same in the two countries? The men are very much the same. We have the finest opportunity of exchanging ideas by the wonderful way that we have been brought together in this war. We are together now. Do let us remain together and work side by side, not merely from the selfish point of view of earning money and paying dividends, but of trying to improve the condition of humanity.

BORING OPERATION ON THE GUN AT THE WORKS OF MESSRS. VICKERS LTD., SHEFFIELD, ENGLAND

THE *Marine Journal*, of New York, says, "It was the American idea of a convoy system that won the war in putting our troops safely across the Atlantic." Such rubbish is as nauseating to the well-informed American as it is to the British or Canadian reader. In the light of the wonderful change of feeling that has taken place between United States and Britain, the writer who pens such rubbish should be placed in the extra hazardous class. His vision is of the knot-hole size, and is not suitable for spreading abroad.

WHEN a man leaves off his vest and coat for the summer, where is he going to wear his fountain pen?

Methods of Milling and Boring Yoke and Cap

Illustrating Various Jigs Employed in the Various Operations Throughout the Manufacture of These Pieces

By F. SCRIBER

THE purpose of this article is to illustrate methods which have proved profitable for machining the yoke and cap (Fig. 1). This yoke has an elongated slot cast at one end, which slot is swung from the radius A and is not finished by machining, although both sides of the bosses surrounding it are finished, all finished surfaces being indicated by the F marks in the usual manner.

The first operation on the yoke and likewise on the cap is to machine the surfaces where they bolt together, and used on a turret lathe having the necessary boring, reaming and facing tools, also a back facing bar of the type shown in Fig. 8.

Referring to Fig. 2 the yoke A is located in a vee block B, which is relieved in the centre so both ends of the large boss on the yoke will rest in it. The outer end of the long arm on the yoke rests against the block C, which locates the yoke radially. To securely hold the yoke in place under the cutting strains two clamps, D and E, are provided which grip the work in the rough hole, while a pin F is used to take the thrust of the cut, four cutters being used to mill the tongue groove and surface as shown by the sectional view of the cutters.

Fig 3, in which the cap for the yoke is milled, also shows a sectional view of four cutters which surface the cap and mill the tongue. To hold this cap while milling it is located on three pins A, B and C, and is pushed back against the steel seat D by the clamp E, this clamp being backed up by the solid cast iron part of the fixture at F, while the bolt G and nut, of course, operate this clamp to grip the work.

There is a decided advantage in arranging a clamp as shown in this fixture, as it being on an angle it is possible to arrange it so the nut on the bolt will not interfere with the cutters when milling across, although in this particular instance no trouble would arise from this source were other types of clamps used as there is plenty of room. The advantage of this type of clamp in this instance lies in the fact that this clamp does two things: it holds the work down and pushes it against the seat D, at the same time, while when released the work is readily removed as the clamp does not go over the top of the work and, therefore, need not be pulled out of the way.

Before going ahead with the boring on these yokes the elongated bosses are straddle milled as shown in Fig. 4 by the

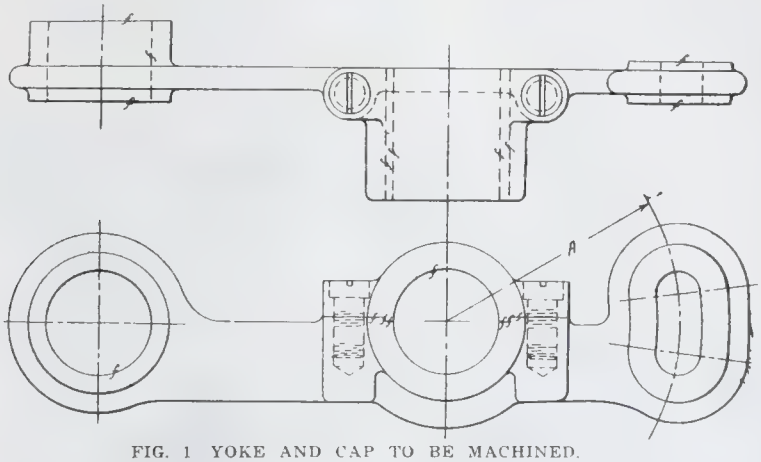


FIG. 1 YOKE AND CAP TO BE MACHINED.

this is done as illustrated in the fixture (Fig. 2) for the yoke and Fig. 3 for the cap. Following this the bosses at the elongated slot are machined by straddle milling, using the fixture shown by Fig. 4, for holding the yoke at this time. Next both the yoke and cap are held in the drill jig (Fig. 5), while the screw holes are drilled and counterbored. The two parts are then held together by the screws, the holes in the yoke being, of course, first tapped to receive them. For the purpose of boring the two large holes face plate fixtures of the type shown by Figs. 6 and 7 are used, these being

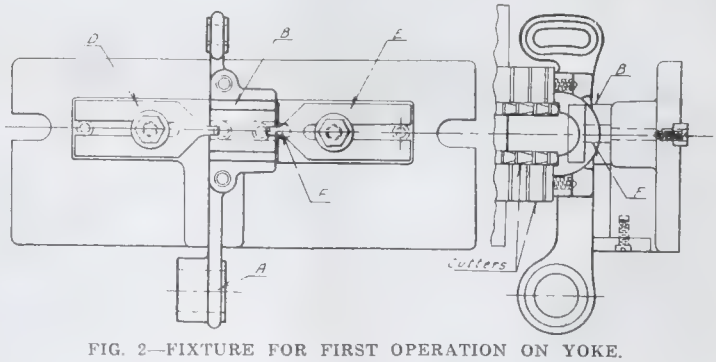


FIG. 2—FIXTURE FOR FIRST OPERATION ON YOKE.

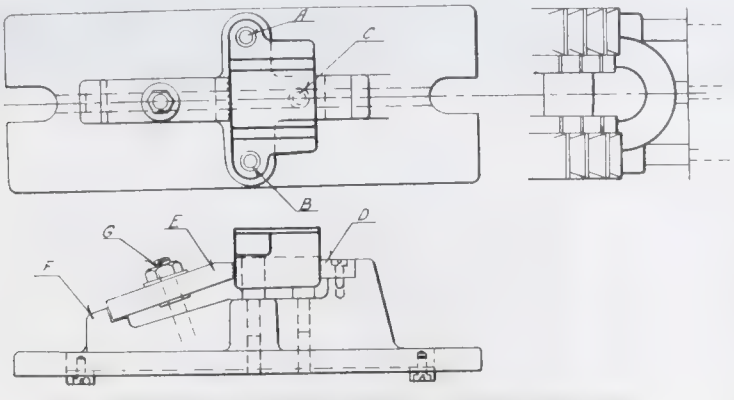


FIG. 3 -FIXTURE IN WHICH CAP FOR YOKE IS MILLED.

two cutters A and B; the work in this instance is located by the tongue groove by means of the swinging cover and it is held against this swinging cover C by means of the spring pin D, that is to say, when the cover is down in the position shown and is held by the swinging bolt E, the spring pin holds the work against the cover, the spring pin in turn being held by screw F, which has a tapered shoe in front of it. This squares the work up and for locating endways two screws are used, one G being stationary while the one H is adjustable and is used for binding the work. To remove the work after milling it is simply necessary to swing the cover C out of

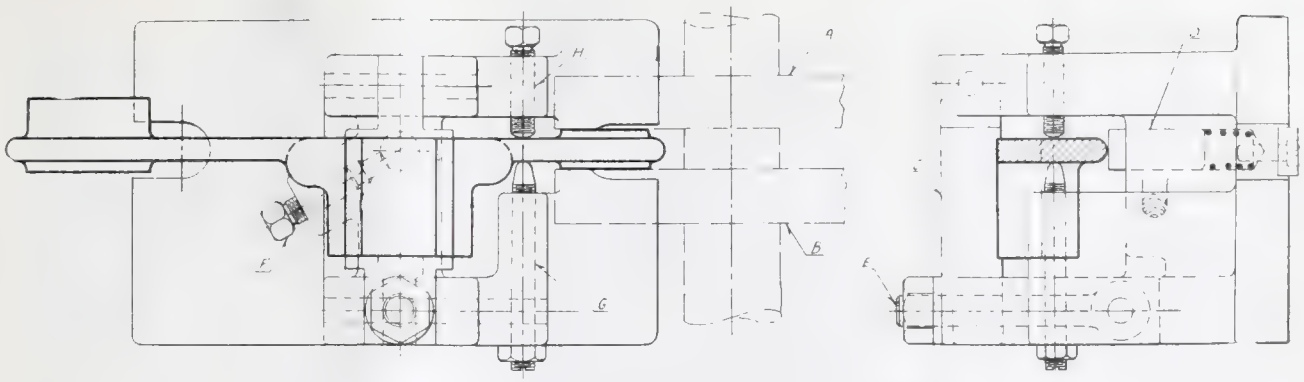


FIG. 4—FIXTURE IN WHICH THE ELONGATED BOSSES ARE STRADDLE MILLED.

the way, loosen the set screw H and take out the work, after which the screw F is released slightly and the jig is ready to receive another part.

Both the yoke and the cap are now placed in the jig (Fig. 5); after being fitted together they are set on two pins A and B, which go under the bosses

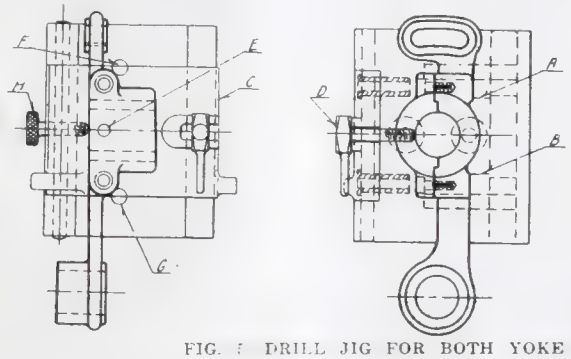


FIG. 5—DRILL JIG FOR BOTH YOKE AND CAP.

which have the screws in them. A hinged cover is also used in this jig, this being designated by letter C, the cover is swung into position and held there by the quarter turn screw D, while the set screw E holds the work tight in position. To locate the work endways two pins, F and G, are employed, which together with the screw H locates the work in the correct position (from the boss) for drilling and counter-boring for filister head screws.

After drilling and counterboring the parts are removed from the jig and the screw holes are tapped into the yoke. Next after cleaning all the chips out the screws are put into position and the cap and yolk are next machined together. The first hole bored is the large centre hole, and by refering to Fig. 6 the manner of accomplishing this will be clearly understood.

Advantage is taken of the finished bosses at the elongated slot for squaring the work in this instance, while the hole is bored central with the large boss by locating the boss in the vee block A. This vee block is of the floating type and is beveled off so as it will only bear at the centre of the vee. To hold the yoke in this vee block the square head screw B is used. After settling the work up lightly in the vee block it is securely locked in place by the nut and washer C, which pulls it down against the stud D. When this is done the set screw B is firmly set up and the yoke is then held securely, all that is necessary for the actual boring, although to eliminate chatter a spring pin E is used under the long end of the yoke. Were this not done there would be a constant rattle of this long end, while machining the work. The main part of this fixture is made of cast iron and it contains a pilot bushing for guiding the boring bars while they are machining out the holes.

Fig. 7 illustrates the final operation on this part, which consists of boring the hole at the long end and advantage is taken of the hole just machined and the finished boss at the elongated slot to hold the work. The fixture itself is of cast iron and is indicated as A, an expanding bushing B in the centre hole correctly locates the yoke and a stud C, with nut and washer, grips the short end, while the long end, which is being machined, is securely held against the fixed screw D by means of the adjustable screw E. These two last screws take all cutting strains directly, the other bushing and stud being just used for locating purposes, although they also do their share in supporting the work.

It will be noticed that two cast iron lugs, F and G, are used on this fixture, their function is to counter-balance the yoke so the fixture will revolve without pounding. As it is necessary to finish the back of this boss as indicated at X advantage is taken of the back facing bar in the machine to do this. This back facing bar is, therefore, indicated on the drawing as it comes through the headstock spindle.

For doing the actual work facing a type of tool such as is shown in Fig. 8 is used. In connection with this tool a boring bar, A, is shown, this, of course, machines out the hole and is supported

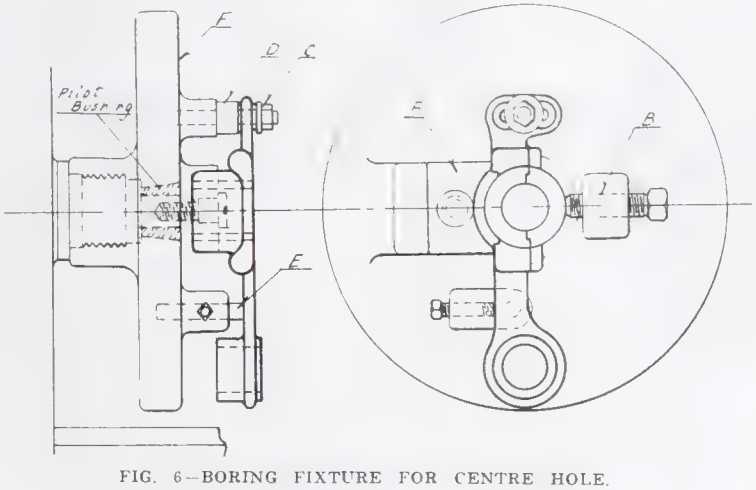


FIG. 6—BORING FIXTURE FOR CENTRE HOLE.

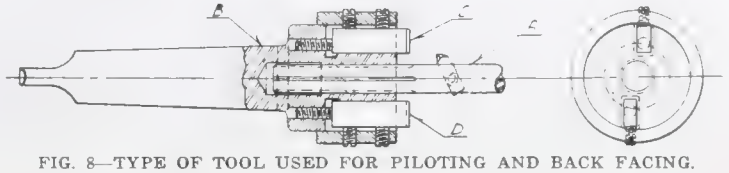
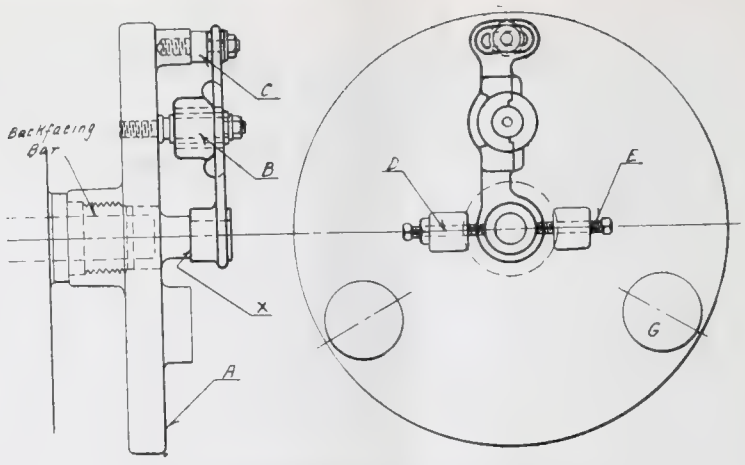


FIG. 8—TYPE OF TOOL USED FOR PILOTING AND BACK FACING.

at its free end in the shank of the back facing tool B, while two cutters, C andD, do the actual back facing, these again being clamped and backed up by the screws shown. This arrangement of combination boring, facing and back facing, does away with one operation on the part and where one cut is sufficient to accomplish a satisfactory finish of the work it is the economical thing to do.

While, of course, tools actually as shown would not be applicable to many jobs, still it is believed the principles involved will convey suggestions which will be found valuable in handling other tool arrangements for machining work.



BORING ARRANGEMENT FOR END HOLE.

The Electric Furnace and the Non-Ferrous Metals

The Following Paper Was Read by the Author Before the Cleveland Engineering Society on March 11. The Utility of the Electric Furnace for the Melting of Non-Ferrous Metals and Their Alloys is Clearly Developed

By E. F. COLLINS, General Electric Co.

Continued from last issue

Fig. 3 shows a working installation of furnaces of this type, having melting capacity of 1,500 lbs. of brass per hr. The most recent design of this type of 1,500 lbs. furnace is shown in Fig. 4, which illustrates a class 1 type furnace, in the furnace classification table already given.

The induction type of furnace is said to be exceptionally efficient thermally while melting. We shall see, however, that its overall working efficiency for the week is not appreciably from furnaces of Class 1, and it is desired to call attention to the fact that kw. hours per ton consumed in melting by no means indicates the highest overall working efficiency. Suppose for illustration we concede that the induction type of furnace has the highest thermal efficiency in melting. A certain furnace of this type has a crucible capacity of 400 lbs., and no load loss or radiation of 8 kw. hrs. per hour, and melts a charge of red brass each hour. Suppose a charge is poured at 1,300 C., it is necessary to use hand ladles pre-heated in pouring the charge. The furnace must be kept hot 24 hours per day, when the crucible has once been heated up. Let us now compare the effective working kw. hrs. consumption per ton with that of a 2,250 lb. per hour tilting type furnace of design described by the speaker, and melting 18,000 lbs. of red brass per 8-hour day. It will be noted that this furnace may be charged by machine, whereas the crucible furnace must be carefully charged by hand. One man's labor will operate, i.e., charge and melt this metal, say at $4.50 per day, or for $1 per ton labor. Pouring of charge will be by hand ladle, preheated, and should cast the same as pouring a like quantity of metal from crucibles.

It seems that since 5 to 6-400 lb. furnaces must be employed to give same metal output as one 2,250 lb. tilting furnace, that the labor of attendance, charging and melting should cost at least 2¼ times as much in the crucible furnace as in tilting hearth type, or 2.25 per ton. Hence, it follows from above that:

Metal melted per week in 400 lb. crucible induction furnace, 8-hr. working day, will be 48x400=19,200 lbs.

Kw. hrs. to melt 19,200 lbs. at 200 kw. hrs. per ton will be 200x9.6=1,920 kw. hrs.

Kw. hrs. to keep furnace hot while not melting, 24x7=168; 168—48=120 hrs. per week will be 120x8=960.

Total kw. hrs. per week	2,880.
Kw. hrs. per ton, 2,880/9.6=300.	
Power cost per ton at $.01	$3.00
Excess labor cost of 400 lb. crucible furnace over 2,250 lb. tilting hearth per ton	1.25
	$4.25

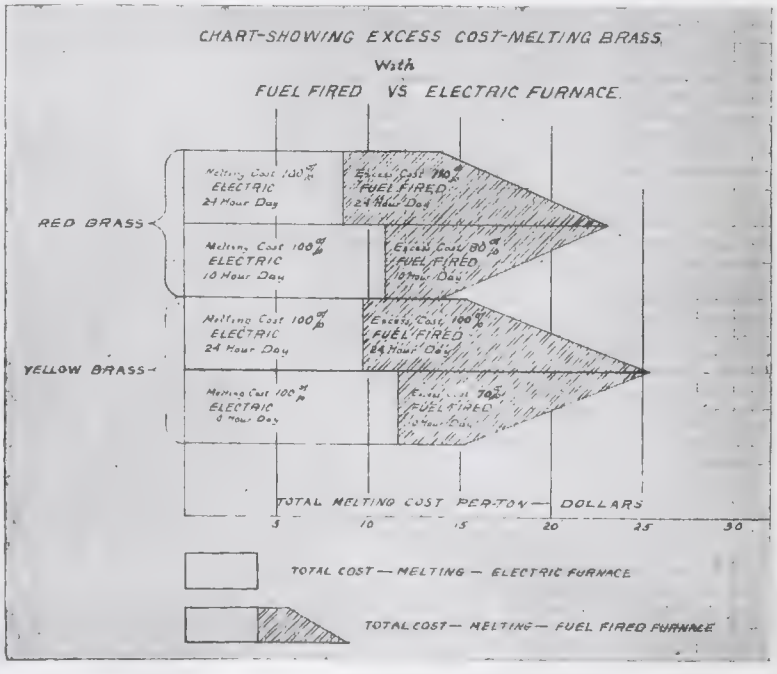


CHART 1—EXCESS COST OF GAS MELTING OVER ELECTRIC IN THE MELTING

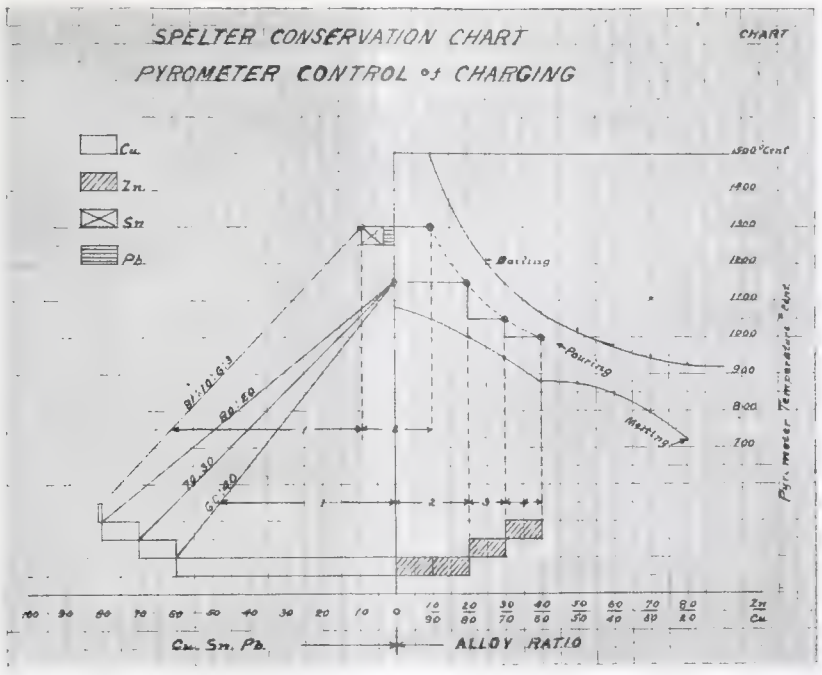


CHART 2—SPELTER CONSERVATION CHART WITH PYROMETER CONTROL OF CHARGING.

This $4.25 is the power costs that may be allotted per ton to the 2,250 lb, furnace and maintain equal all week effiiency for the same total amount of metal melted by either furnace. In other words if the large tilting furnace melts with the not unexpected consumption of 425 kw. hrs. per ton it has equalled the performance of the induction crucible furnace, which, offhand, seems much more efficient because we say it melts for 200 kw. hrs. per ton. Large capacity induction furnaces might change the above somewhat, but the speaker does not know of any successful design on the market at present for melting brass in capacity exceeding 600 lbs. In fact these are limited in their use to certain mixtures only. Leaded brass above three per cent., I believe, cannot be successfully handled due to fluxing action on crucibles.

The above clearly shows that a furnace should not be selected merely because it melts at a low kw. hr. per ton, but all its other characteristics should be studied, and its overall cost of turning out metal considered when conforming to local conditions, since different working cycles may give widely different overall results.

Cost of Electric Melting vs. Fuel Fired Furnaces

The speaker wishes to call attention to certain characteristics, losses, handicaps, etc., which influence the overall cost of melting, and must be considered in making up true melting costs. These will now be considered and their effect shown upon costs as tabulated in the table.

Sources of Melting Loss in Melting

(1) Temp. control, electric, excellent; fuel fired, indifferent. (2) Size of charge, electric, controllable; fuel fired, controllable. (3) Gas flow from furnace, electric, negligible; fuel fired, large volume of combustion gases must pass out. (4) Furnace atmosphere chemical condition, electric, free from oxygen and injurious gases; fuel fired, contaminated by impurities of fuel, protection against oxygen only through excess fuel supply. (5) Speed of melting, electric, much greater than fuel fired; fuel fired, much less than electric.

The above statement is the principal loss in melting brass alloys. It will be noted that conditions are under absolute control in the case of the electric, whereas in fuel fired places the control of temperature is indifferent, and large volumes of gas of combustion must pass through the furnace and likewise since heat is generated through oxidization of fuels, the furnace chamber cannot be free from oxidizing and contaminating influences upon the metal.

First Source of Loss
Temperature Control
In a Given Electric Furnace, Pounds of Metal Lost in Melting Increases As The Temperature for Forming Lies Above Melting Point of Alloy

In illustrating how lack of temperature control may increase metal losses in melting brass, let me present the following test: First, 70:30 brass is made in the electric furnace taking 420 lbs. of copper and melting down and then adding 180 lbs. of zinc, at 1,170 degrees C., pouring at 1,150 degrees C. Second, 420 lbs. of copper was melted down and 180 lbs. of zinc added at 1,100 C., and poured

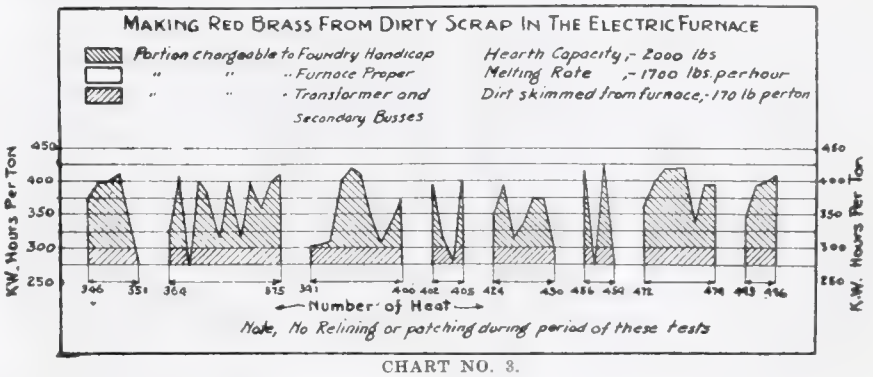
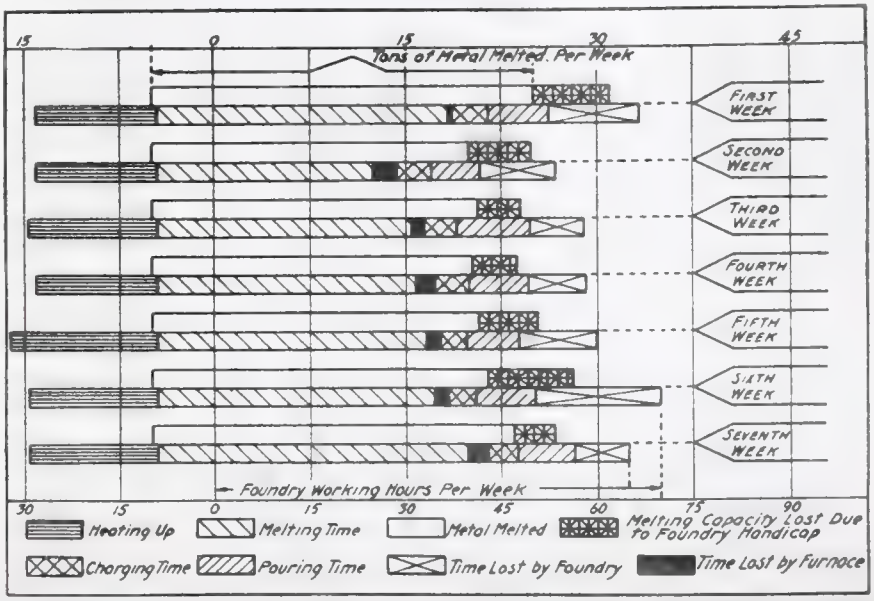

MAKING RED BRASS FROM DIRTY SCRAP IN THE ELECTRIC FURNACE
Portion chargeable to Foundry Handicap
" " " Furnace Proper
" " " Transformer and Secondary Busses
Hearth Capacity,- 2000 lbs
Melting Rate ,- 1700 lbs. per hour
Dirt skimmed from furnace,- 170 lb per ton
KW. Hours Per Ton
Number of Heat
Note, No Relining or patching during period of these tests

CHART NO. 3.



THIS CHART SHOWS THE CONTINUITY OF ELECTRIC FURNACE SERVICE IN MELTING BRASS COMMERCIALLY.

at 1,100 degrees C., with the following tabulated results:

TABLE 2.

Yellow Brass Metals lbs.	Temperature of alloying.	Pouring Temp.	Alloy recovered	Per Cent. Zn. loss	Per Cent. Metal loss
(a) 420 cu.	1170° C.	1150° C.	565 lbs.	19	5.8
180 zn	2140° F.	1150° C.			
(b) 420 cu	1100° C.	1100° C.	590 lbs.	5 6	1.6
180 zn.	2010° F.				
CHEMICAL ANALYSIS. Test Corresponding to Above.					
(a) Cu. 70	1170° C.	1150° C.	Cu. 75.9	24	7.8
Zn. 30			Zn. 24.1		
(b) Cu 70	1100° C.	1100° C.	Cu. 71.3	5 5	1.6
Zn 30			Zn. 28.7		

The results in Table 2, showing the effect of temperature on the same metal (yellow brass) are consistent with a curve shown as melting and boiling curves, chart 2. If one follows the pouring temperature curve shown he will not get excessive metal loss in melting in the electric furnace. If one can keep under this curve then losses will be decreased. Hence, one may control the melting loss readily in the electric furnace by observing this alloying and pouring temperature.

Second Source of Loss in Melting

The Number of Pounds Lost on Melting Is Independent of Charge in a Given Electric Furnace, Free From Ventilation

Metal Melted	Charge Lbs.	Temp. Melt.	Metal Loss
2696 lbs.	674	1100° C	1.4%—37.6 lbs.
3727 lbs.	832	1200° C	1.3%—38.4 lbs.

Third Source of Loss in Melting

In the fuel fired furnace the magnitude of loss from this source is influenced by speed of melting and pressure, volume and velocity of gases flowing over the melting metal; thus increasing the atmospheric pressure in furnace, decreasing the volume and velocity of the gases tends to reduce volatilization loss. For each fuel there is a maximum limit to gas speed or velocity through the furnace since each fuel in developing the required heat units to get the heat out at a given speed must develop a certain volume of gases which must pass out. Hence the proper gas velocity is inseparably connected with products of combustion results from various fuels. Approximate volume of flue gases average in coal, coke and oil furnaces from 3,350 to 5,800 cu. ft. per 100 lbs. of metal melted. Hence, it is easy to see how the flow of gas may bring about a very large volatile loss in the fuel fired furnace. In the electric furnace the gas flow is very small and consequently, though its atmosphere be saturated with metal vapors, so little gas leaves the furnace during the melt that the loss resulting is negligible.

Fourth Source of Loss in Melting Oxidization

Copper, zinc, tin and lead, the constituents of commercial brasses, are all very readily oxidizable at the temperatures to which they must be heated for melting and pouring. Oxidizing results in loss of metal and actually burns the metal to a dross. One can readily maintain a neutral or reducing atmosphere in the electric furnace, but it is certain that carbon monoxide must be so high and oxygen so low that one cannot, in ordinary fuel furnaces, hope to maintain a reducing atmosphere without sacrificing many heat units through burning carbon to CO instead of CO_2.

Gas absorption is proportional to the temperature and the time metal is held in contact with gases. Incidental and intimately connected with oxidization of metal is the absorption of gases. In melting the constituents of an alloy, a gas may enter into chemical union with some of its metals, forming oxides, or they may be occulated in the alloy. As an illustration, when silver is molten (1,020 degrees C.), it can absorb about 20 times its own volume of oxygen. On cooling it gives up the oxygen absorbed as evidenced by the well-known spitting of silver on freezing. Absorption of gases is greater as the temperature increases, since when the metals freeze, absorbed or dissolved gases are given up. If they are unable to pass through the metal before it freezes sponginess and blow holes in the alloy will be produced. The same effect may be produced by air trapped in pouring, by gases evolved by moulds or cores when hot metal enters them, but dissolved gas is unquestionably a principal source of porosity and blow holes. All fuels used in the foundry at the present time contain sulphur in some degree. This sulphur is a very common cause of trouble. Melted brass absorbs sulphur greedily and gives it up upon cooling in the sand moulds, forming porosity and blow holes. One successful brass foundry asserts that many of the failures usually attributed to oxygen are really due to sulphur. In the most careful crucible melting in coke fired furnaces, the metal will absorb .002 to .005 per cent. sulphur, Figs. 5 and 6. Sulphur accumulates in a metal each time melted, which accounts for the dark skin of rerun castings, as compared with first melt metal.

(To be continued.)

Average Cost of Melting Brass with Fuel-Fired or Electric Furnace.

Furnace type	Pit	Pit	Tilting	Pit	Reverb.	Pit	Tilting	Crucible	Crucible	Tilting	
Furnace draft	Natural	Forced	Forced	Natural	Natural	Forced	Forced	Burner	Burner	Electric	
Furnace fuel	Coke	Coke	Coke	Coal	Coal	Oil	Oil	Natural Gas	City Gas	Electric	
Fuel cost price	9.75	9.75	9.75	8.00	8.00	0.098 gal.	0.098 gal.	0.30M	0.60M	0.015 kw.-hr.	
Cost per Ton Making Red Brass. Pouring at 1300 deg. C. (Zinc 10 per cent. or less).											
Fuel quantity	1400	700	600	1200	900	50 gal.	50 gal.	4800	7000	100 kw. hr.	10 hr. 250 kw. hr.-24 hr.
Metal loss	70	30	30	70	124	30	44	40	40		15
Fuel cost	$6.82	$3.41	$2.92	$4 80	$3 60	$1 90	$5.88	$1.44	$4.20	$6 00	$3 75
Zinc value at 10c lb.	7.00	3.00	3.00	7.00	12.40	3.00	4.40	4.00	4.00	1.50	1.50
Cost reclaiming	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.15	0.15
Renewals and repairs	0.40	0.40	0.35	0.40	0 50	0.50	0.50	0.35	0.30	1 00	1.00
Cost preheating crucible	0.40	0.40	0.40	0.40	0.40	0.40	0.10	0.40	0.40	0.10	0.10
Furnace labor	2.25	2.25	2.25	2.25	1.50	2.25	1.50	2.25	2.25	1.00	1.00
Miscellaneous and labor and fuel	0.50	0.50	0.50	0.50	0.50	0.40	0.40	0.40	0.40	0.20	0.20
Cost charcoal	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.05	0.05
Air for blast	....	0.15	0.15	....	....	0 15	0 15	0.15	0 15	....	....
Crucible cost	5.00	5.50	5.50	5.00	....	8 00	....	8.00	8.00	....	....
Interest crucible stock	0.10	0.10	0 10	0.10	....	0 10	....	0.10	0.10	....	....
Lining pouring crucible	....	....	0.30	....	0.30	....	0.30	0.30	0.30	0.30	0.30
Electrodes and coke	....	....	....	....	....	....	....	....	....	0.60	0.60
Cost per ton—total	$23.09	$16.33	$16.09	$21.07	$19.82	$20.32	$13.85	$10.01	$20.72	$10.90	$9.65
Cost per Ton Making Yellow Brass (Zinc 10 to 40 per cent.)											
Fuel quantity	1000	600	400	700	400	40 gal.	45 gal.			(350 kw. hr. (10-hour day	220 kw.-hr. 24-hour day
Metal loss	100	40	36	100	200	60	70			30	
Fuel cost	$4.88	$2.92	$1.95	$2.80	$1 60	$3 92	$4.41			5.25	$3 30
Zinc value at 10c lb.	10.00	4.00	5.60	10.00	20.00	6.00	7.00			3.00	3.00
Cost reclaiming	0.50	0.50	0.50	0.50	0.50	0.50	0.50			0.15	0.15
Renewal and repairs	0.40	0.40	0.35	0.40	0.50	0.50	0.75			1.00	1.00
Cost preheating crucible	0.40	0.40	0.40	0.40	0.40	0.40	0.10			0.10	0.10
Furnace labor	2.25	2.25	2.25	2.25	1.50	2.25	1.50			1.00	1.00
Miscellaneous and labor and fuel	0.50	0.50	0.50	0.50	0.50	0.40	0.40			0.20	0.20
Cost charcoal	0.12	0.12	0.12	0.12	0.12	0.12	0.12			0.05	0.05
Air for blast	....	0.15	0.15	....	....	0.15	0.15			....	....
Crucible cost	4.50	5.00	5.00	4.50	..	4 50	....			....	....
Interest crucible stock	0.10	0.10	0.10	0.10	....	0 10	....			....	....
Lining pouring crucible	....	....	0.30	....	0.30	....	0.30			0.30	0.30
Electrodes and coke	....	....	....	....	....	....	....			0.60	0.60
Cost per ton—total	$23.66	16.34	$17.22	$21.57	$25.42	$18.84	$15.35			$11.65	9.70

Shop Arithmetic, Cube Root and Mensuration

Seventh of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinist Trade—The Present Article Takes Up the Two Subjects Mentioned in the Title.

By J. H. RODGERS

THE extraction of the cube root of a number is quite similar to the process for finding the square root, but involves additional calculations. The method, however, is easily acquired with a little study and application. Like square root, the number is divided into periods, but in the case of the cube root the periods have three figures each. The largest number expressed with one figure is 9, and the cube of 9 is 729, (three figures). The largest number expressed with two figures is 99, and the cube of 99 is 970,299 (six figures, or two periods of three figures each). Therefore, the cube root of a number less than a thousand would be a number less than ten, and possibly a fraction. The cube root of a number over a thousand and less than a million would be a number having two figures or two figures plus a fraction.

The process of extracting the cube root of a number can best be explained by a concrete example. Suppose it is desired to make a cube of cast iron that will weigh 3,042 lbs., the weight of a cubic inch of the metal being ¼ of a lb. The number of cubic inches in the block would be the total weight divided by the weight of one cubic inch.

$$\frac{3042}{.25} = \frac{3042}{1} \times \frac{4}{1.} = 12168 \text{ cu. in.}$$

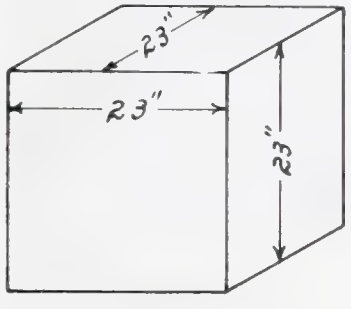
Now as the block is a cube, (equal on all sides), the length of one edge would be equal to the cube root of 12,168, and the solution would be 23.

The number is first divided into periods of three figures each, commencing at the right or unit figure. The first period, then, is 12, and the largest number whose cube is less than this is found (mentally), to be 2, as 2x2x2=8. This root is then placed in the quotient and likewise to the extreme left column, A, and the product of these two placed in a central column, B. This result is then multiplied by the root and the product placed under the first period. Add the root, (2), to the first column and multiply the result, (4), by the root, (2), and add this result, (8), to the column B, and annex two ciphers, obtaining the trial divisor 1,200. Add the figure of the root to the first column, A, and annex one cipher. It is found that the trial divisor is contained in the new dividend three times; this figure, (3), is the second figure of the root. Add it to the first column, A, and multiply the result by the root just found, (3), and add the product to the trial divisor for the true divisor. Multiply the true divisor by the last figure of the root, (3), and place the product under the dividend. In this instance the remainder is 1 and need not be considered further, as it has an insignificant value. The cube root of the number 12,168 is then 23; or a cube of cast iron, 23 inches on a side, would weigh 3,042 lbs.

The cycle of operations in extracting the cube root might be stated as follows. Divide the number into periods of three figures each. Find the largest number whose cube is less than the first period, for the first figure of the root. Place this in column A. Multiply by the root figure and place result in middle column, B. Multiply by the root figure and subtract the result from the first period, and annex the next period to the remainder. Add the root figure to column A, and multiply by the root figure, adding the result to column B, and annex two ciphers. Add the root figure to column A and annex one cipher. Divide the dividend by trial divisor, (column B), for the next figure of the root, and repeat the process just explained.

$\sqrt[3]{12168}$ = 23

(A)	(B)	
2	4	12168 | 23
2	8	8
4	1200	4168
2	189	4167
60	1389	1
3		
63		



If the above explanation is not quite clear to any reader, further details will be given on request, or a brief study of cube root can be had from any text book, as evolution is largely used in solution of shop problems, and will be frequently required further on in the course.

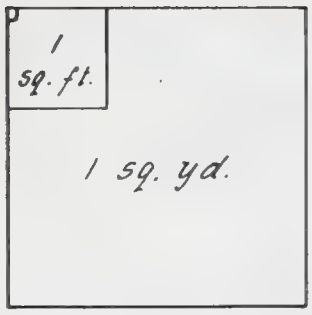
Mensuration

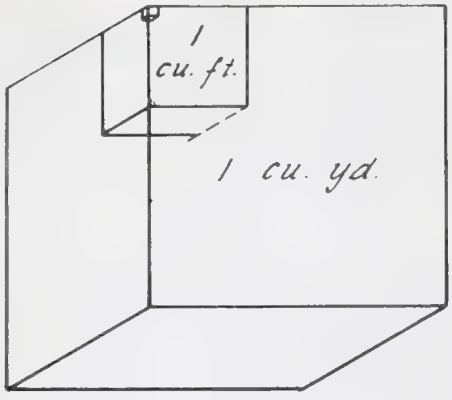
As it is very difficult to give a practical example of the application of one phase of mathematics without involving other elements, the instruction, so far, has been of an elementary character, outlining the fundamental processes necessary for the solution of actual shop problems. Many other important details are required to be learned, but it is only in their variety of uses that they may be termed different, as every mathematical calculation is based on the four primary fundamentals, namely addition, subtraction, multiplication and division. All reckoning is based on these four principles, either singly or in combination.

A very large percentage of shop problems are possible of solution by mensuration, or the application of that branch of geometry that deals with the measurement of lines, surfaces and solids; in other words, distances, areas and volumes. It is taken for granted that all followers of this series are familiar with the various tables and values upon which mensuration depends, such as linear, square and cubic measure. Distance is measured in length only. Areas are measured in length and breadth. Volumes are measured by length, breadth and thickness. In square measure a unit is always taken as a base, such as the square inch, square foot, square yard, etc.

These sketches are a graphical representation of the three principal units of square and cubic measures. It will be seen from the above that area deals with an enclosed space bounded by definite lines, and that at least three straight lines are necessary to define the surface. In treating on mensuration we will consider some of the more common figures connecting with the triangle. The area of a triangle is equal to one-half the product of the base and the altitude, or distance from the base to the opposite apex, as at D.

When a four sided figure is a perfect square, or when the space enclosed is a rectangle (four sided figure with four right angles), the area equals the length times the breadth. If the area is known and one of the sides, the other side may



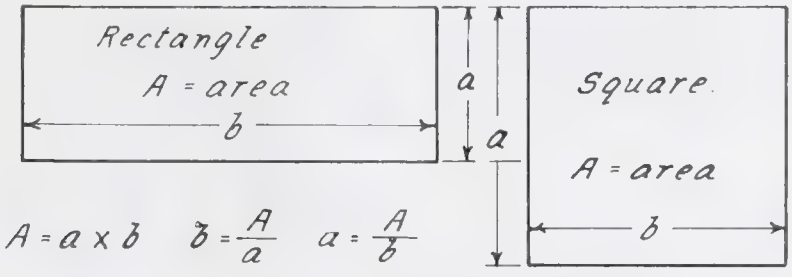


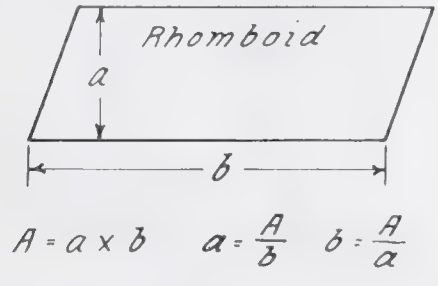
be found by dividing the area by the known side.

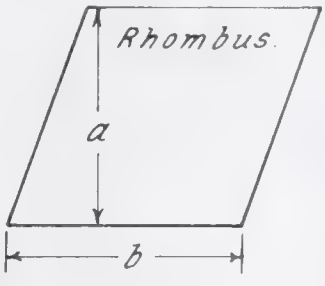
A modification of these two figures is shown below, where the two opposite sides are parallel, the opposite angles are equal but none of them right angles. The areas of these figures are found by multiplying the base, B, by the altitude, A.

When only two sides are parallel, the figure is called a trapezoid, and the area is found by multiplying one-half the sum of the two parallel sides by the altitude.

A four-sided figure that has no two sides equal nor any two of the angles equal is called a trapezium, and the area is found by dividing the space into two triangles, by drawing a diagonal line and finding the area of the two triangles as explained above.







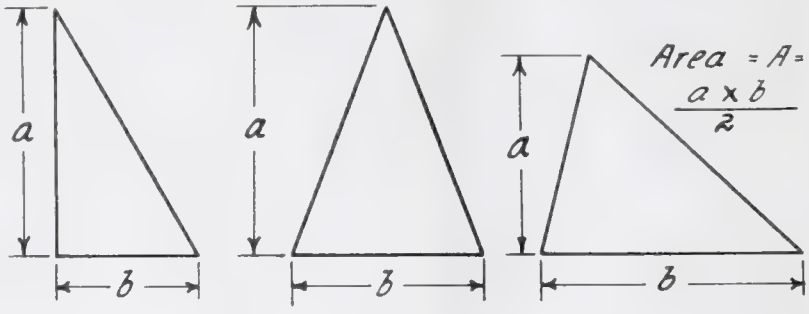
As the area of other straight-lined figures are determined by modifications of the foregoing, they will not be treated on here, but will be considered under the head of trigonometry, as related to shop practice.

The circle, with its various component parts and elements, is met with more frequently than any other single element of mathematics. The space enclosed is larger than in any other figure bounded by the same length of perimeter or circumference. A graphical comparison of areas for equal perimeter is here shown.

The circumference of a circle is found by multiplying the diameter by the constant 3.1416, and the area is found by squaring the diameter and multiplying by the constant, .7854. If the area is known the diameter may be found by dividing by .7854 and extracting the square root of the quotient. A piston is to have an area of 200 sq. in., what will be the diameter?

The areas of regular figures vary as the square of their sides or diameters. That is to say a square 3 inches on a side will be nine times as large as one 1 inch on a side. Or a circle whose diameter is two inches will only be one-quarter the size of one four inches in diameter. This can be illustrated more clearly by means of a simple sketch.

If a piece of steel 1 foot long, and one inch in diameter weighs 2 2-3 lbs., what would be the weight of a bar of similar steel 5 inches in diameter and 8 feet long? As the areas vary as the square of the diameters the weight per foot of the large bar would be,

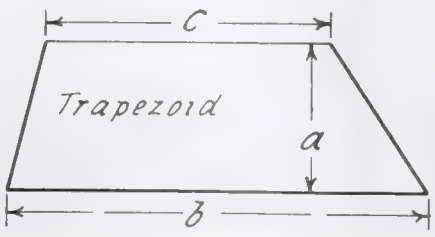


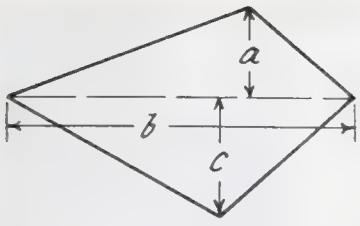
And the weight for the 8 feet would be 66.6x8=532.8 lbs. It might be stated here that a convenient rule for finding the approximate weight of round machinery steel, per foot of length, is to divide the square of 4 times the diameter by 6, or expressed as a formula, and solving the above question, we have,

$$\text{Weight per ft.} = \frac{4xD}{6} = \frac{4x5}{6} = 66.6$$

and for 8 feet the weight would be 66.6x8=532.8 lbs.

In a ventilating system three pipes branch off from the main header, to supply different departments. If the sizes of these pipes are 8, 12, 16 inches in diameter what must be the diameter of the main header to maintain equal pressure or supply to each section? This problem could be solved by finding the combined areas and finding the corresponding diameter for a circle of that area. However, as areas vary as the square of the diameter we can extract the square root of the sum of the squares of the three diamet-



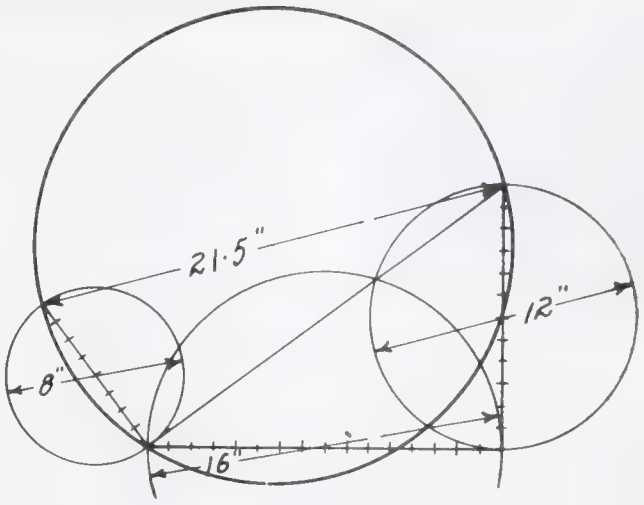


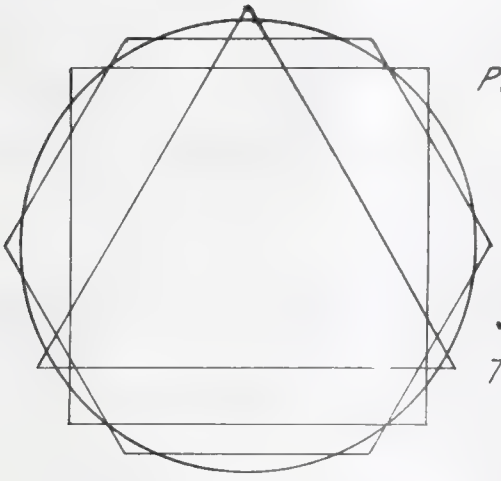
$$\text{Area} = A = \frac{b \times a}{2} + \frac{b \times c}{2}$$

ers, for the required diameter of the main header.

This may be graphically solved by the general method for the solution of right triangles, the sides representing the diameters of the smaller circles, the operation being continued until the final diameter is obtained. The answer to the above is here given.

The application of the above is derived from the fact that the length of the hypotenuse of a right triangle equals the square root of the sum of the squares of the two sides adjoining the right angle.





Perimeter = 12

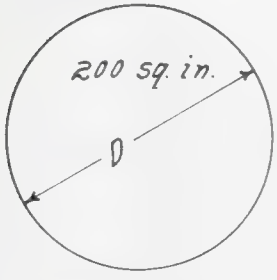
Areas.

Circle = 11·46

Hexagon = 10·4

Square = 9

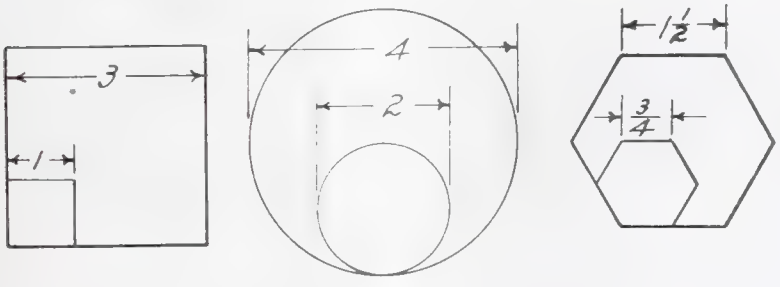
Triangle = 6·9.



$$\text{Area} = D^2 \times .7854$$

$$D^2 = \frac{A}{.7854} = 254{\cdot}65$$

$$D = \sqrt{254{\cdot}65} = 15{\cdot}95''$$



$$1^2 : 5^2 = 2\tfrac{2}{3} : x$$

$$x = 2\tfrac{2}{3} \times 5^2 = 2\tfrac{2}{3} \times 25 = 66{\cdot}6 \text{ lbs.}$$

$$\sqrt{8^2 + 12^2 + 16^2} = \sqrt{64 + 144 + 256} = \sqrt{464} = 21{\cdot}54 \text{ inches.}$$

ELECTRICAL SUBMARINE DETECTOR

By H. J.

This most interesting article describes the invention and development of the submarine detector, which, it is claimed, was largely instrumental in the successful combating of the submarine menace, but for obvious reasons very few descriptive technical details are given. The author describes the collaboration of the British and other allied naval and scientific missions, with the engineers and naval authorities of the U. S. and the firms, individuals, and localities where the experimental work was carried out.

The detector or listening device is fixed on the hull of the vessel and connected through into the interior where the listener was located. The original difficulties caused by the rolling of the boat and the lapping of the waves against the sides were overcome. In the first ocean test made in the autumn of 1917, a vessel was detected by means of sound waves travelling through the water, her course and speed accurately charted and her exact position determined within a point of the compass more than an hour before the vessel herself had become visible over the horizon.

The author recounts the trials made with the apparatus in listening to ships passing in and out of Boston Harbor, and shows that it was not only possible to differentiate between different vessels by the different sounds made by their engines, but that it could even be predicted when a submarine was diving by the change which could be distinctly heard from oil engine to electric motor.

The article is completed by a description of some of the results obtained when the detectors were tried in European waters under the auspices of the British Admiralty and the very exact information which the listeners were able to supply is illustrated by actual examples.

WHAT OUR READERS THINK AND DO

LATHE ATTACHMENT FOR COVERING LICKERINS WITH MATALIC WIRE

B. G. Barrett

BEFORE going into the description of the lathe attachment, let the writer first explain that this covering about to be spoken of goes on what is known as a lickerins roller.

These lickerins rollers are used on a cotton carding engine, and the teeth on the same often get damaged owing to nails or other hard material in the cotton coming in contact with them.

The writer personally knows of one machine of this style which was idle during the war, while waiting to ship the damaged roller to England to be reclothed. It is the writer's strong belief that some plant here in Canada could easily work up a business on this work alone.

Now since the roller proper has been explained let us study Fig. 1, which shows the roller and the attachment complete. The roller, A, is made from grey iron, and a square thread of 1 in. pitch, with eight different starts, is cut on this roller. This operation is performed by means of a chaser, which cuts all the eight threads at one time.

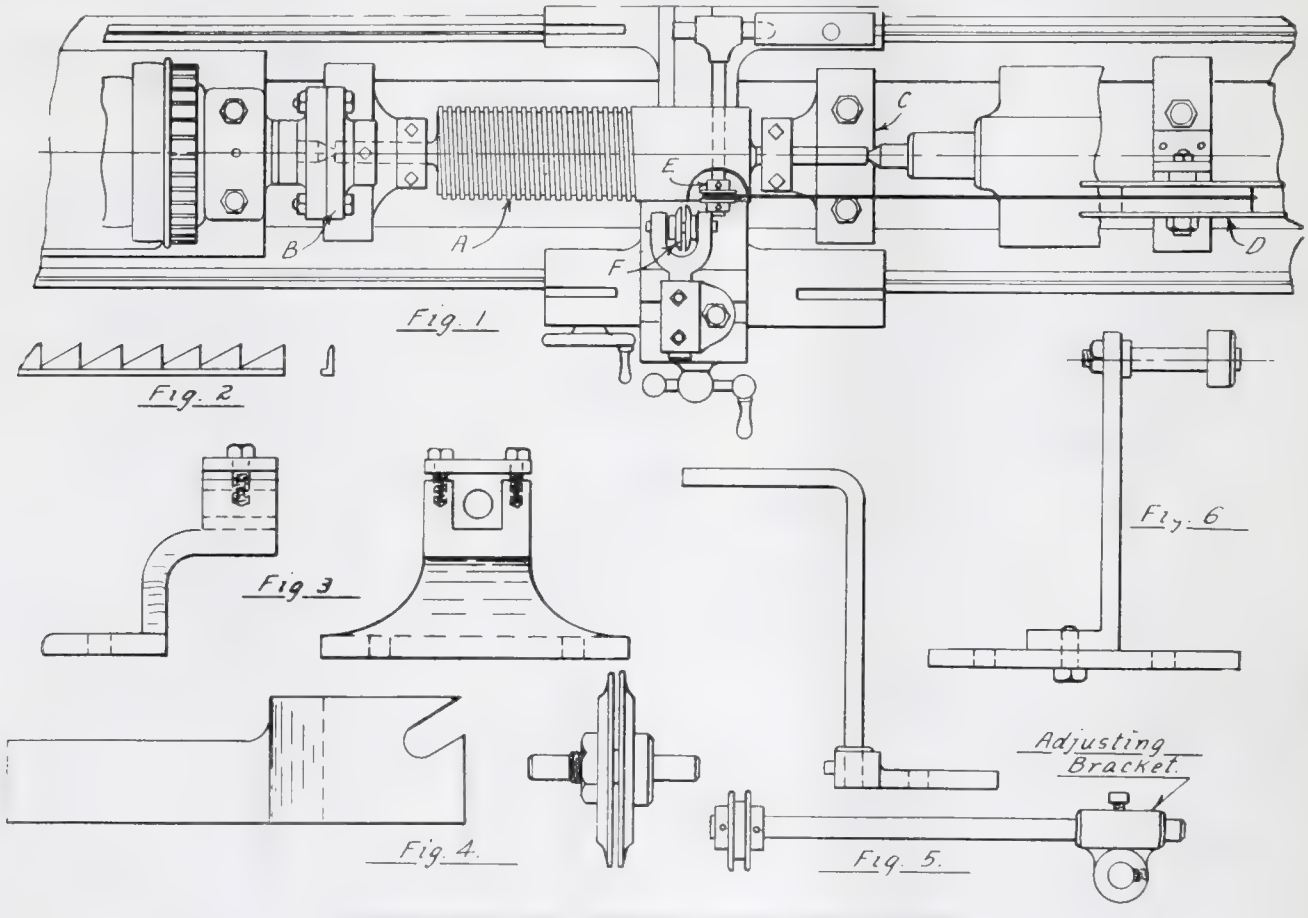
The roller is placed between centres and driven by the floating driver, B. On account of the driving ends being so frail, it is very important that the bracket supports, C, as shown, should be used.

The metallic wire itself is illustrated at Fig. 2. This wire is made from No. 9 round material, the process being to pass the wire through rolls, then punching the teeth out automatically. The teeth are now wound onto a reel, D, as shown at Fig. 1.

This reel is placed on a specially made bracket, which is bolted to shears of lathe (shown in the plan view). The wire is now brought forward over guide roll E, and through pressing mill F. The mill in turn is pressed to roller by use of the cross slide.

The lathe is now started, and, owing to the action of the mill revolving, the bead on the wire is forced into the grooves cut in the roller, and held tight so that all the teeth appear to be separate.

In order to make my description plainer I have shown the attachment separate in different views. Fig. 3 illustrates two views of shaft supports, while Fig. 4 shows side view of mill and mill holder. This mill is made from tool steel hardened and ground, and is held apart to conform with wire to be used on roller by means of tin washers. The complete arrangement is held by means of a tightening nut on the arbor as shown.



VIEW SHOWING THE COMPLETE FIXTURE WITH DETAILS.

Fig. 5 illustrates the guide roll and bracket. This bracket is bolted to the back end of carriage and is adjusted to the required position by means of the bracket on guide roller bar, also by the slot in the lathe carriage.

Fig. 6 shows a side view of the reel carriage which is so simple no further explanation is necessary.

The writer has tried to describe plainly this attachment, and, together with his sketch, believes the same will be easy to follow, but should any reader desire further information I will be only too pleased to forward more information on the subject upon request.

THREE-STOP TURNOVER JIG

By A. E. Kipps

The jig as shown in the accompanying illustration to drill the portion shown in separate view at H.

As can be noticed, the jig is of the turnover type and has three stops in its one revolution. The four views of the jig as shown illustrate its design clearly and further explanation is almost unnecessary except to say that E represents the locating pins, F a slotted washer, and G a taper wedge.

Of course their duties are easily grasped, the washer F being slotted in order that it can be removed quickly without taking the nut off the main spindle. The hole through the work is sufficiently large to allow it to slip over the nut without touching. The taper wedge G merely tightens up the spindle before drilling.

After the installation of this jig the cost of production on the work shown was reduced fully 50 per cent., which was to say the least a considerable saving.

SAVING THOSE OVER-EXPOSED BLUEPRINTS

By J. H. MOORE

While we don't like to admit that sometimes when exposing a tracing with the blueprint paper in place, we underestimate the strength of the light (natural or artificial), yet still the fact remains, and must be faced. Usually a few cuss words are said, the spoiled ? blueprint grabbed, crushed, and thrown into the waste paper basket.

Is This Altogether Necessary?

The writer believes not, for he has seen many a very badly overexposed blueprint brought back to usefulness, and almost normal color, by placing a teaspoonful of hydrogen-peroxide to each quart of water used for washing purposes.

Of course, you first wash the print in clear running water until the blue liquid, which always occurs, is thoroughly washed away. The prints are now placed in the saving solution and soaked in same until the proper color is obtained.

The print is once more washed in clear water.

The describing of the process has, in reality, taken longer than the actual operation, and should readers in like difficulty care to try this, they will be surprised at the results.

CLEANING OFF THE TITLE STAMPS

By J. H. M.

Before entering this article, I hardly know exactly whether I should spill the beans, as it were, or not, but even though I should bring the wrath of all firm owners on my head, here goes.

If readers should ever desire to clean their stamp pads (no matter what the breed) here's an easy tip:

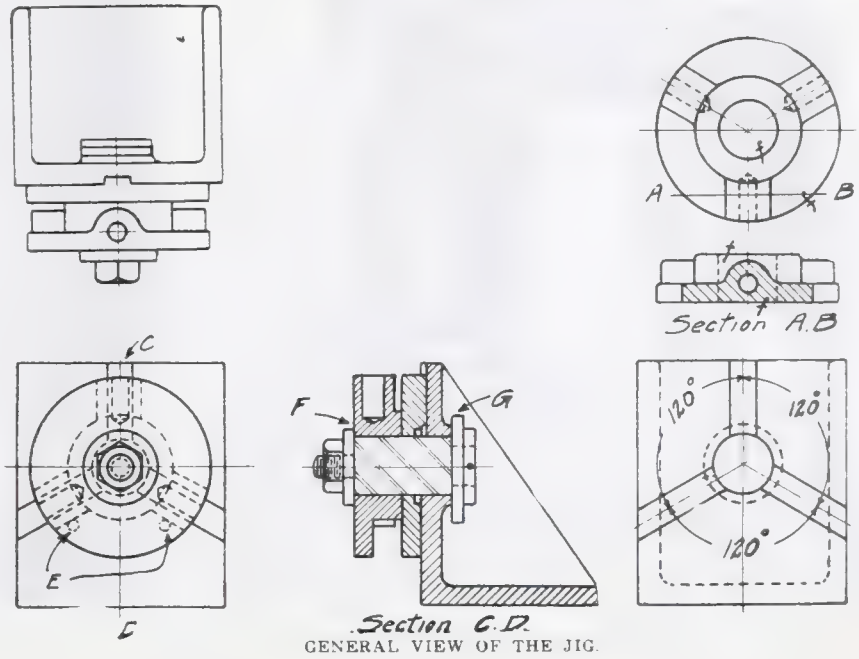
Get hold of one of those fire extinguishers of the Pyrene type, and get a little of the carbon titra chloride out of it, when you will find that you've discovered the ideal stamp cleaner.

However, it might be just as well not to let your executive head see you getting the aforementioned dope.

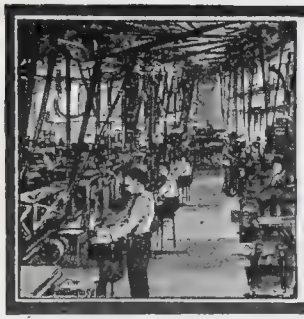
POWDERED COAL

A good many attempts have been made, during the past twenty odd years, to burn coal reduced to a very fine powder in boiler furnaces and in the cylinders of internal combustion engines, but up to the present no appreciable success has been attained in the United Kingdom. In all attempts that have been made, both in connection with the use of coal dust in boiler furnaces, and in engine cylinders, the same process has been followed; the coal has been ground to a very fine powder, practically to an impalpable dust, to a dust of such fineness that it floats in the air, and in any atmosphere to which it has access. In several methods employed for crushing the coal, water has been used to assist in the process, and, as the writer believes, it has not been possible to prevent a certain quantity of the water being converted into vapor, and passing over with the steam of coal dust into the furnace, or the engine cylinder. Of course this is equivalent to firing the boiler or the engine cylinder with wet fuel; the water vapor has to be raised to the temperature of the hot gases formed by combustion, and is in some cases decomposed into its constituents, oxygen and hydrogen, at the expense of the heat furnished by the burning of the coal dust, and thereby lowering the efficiency of the boiler. Probably this would not be a serious matter if the burning of the dust could be carried out continuously and the cost of crushing it was not prohibitive. In the process of washing coal, the water that is employed carries off a certain quantity of the loose dust that is present on the lumps, etc., of the coal; the washing water is drained in to a settling tank, and the coal dust is allowed to fall to the bottom, and it was this dust, carrying a good deal of water, that is being employed. The engineer of the colliery told the writer he had found on testing it that it evaporated a little over 50 pounds of water per pound of coal sludge consumed.

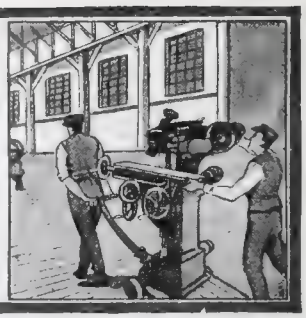
The great difficulty that has arisen in connection with the burning of coal has been to get rid of the clinkers. When the coal has been crushed, in the manner described above, usually no endeavor has been made to separate the ash, the foreign matter, from the coal proper, and so, both in the boiler furnace and in the engine cylinder, small quantities of clinker have been formed, which have deposited on the heating surfaces in the boiler furnaces and boiler flues, and in the valves of the engine cylinder, with the result that while successful steaming has been obtained at first, and a short run with the engine, the deposit of clinker has soon reduced the quantity of steam generated owing to the thermal resistance set up by the deposit, and the engine has been prevented from working.



GENERAL VIEW OF THE JIG.



DEVELOPMENTS IN SHOP EQUIPMENT



GRAY'S ROTARY SHEET METAL CUTTER

THE accompanying illustration shows a new development in the art of cutting sheet metals. This metal cutter is manufactured by the Brown Boggs, Company, Ltd., Hamilton, Ont. It is not a rotary shear, but employs a new method in cutting sheets and plates up to and including 3-16 in. thickness. All kinds of shapes can be made and all springing and buckling are eliminated, a feature which is not found in the metal shear.

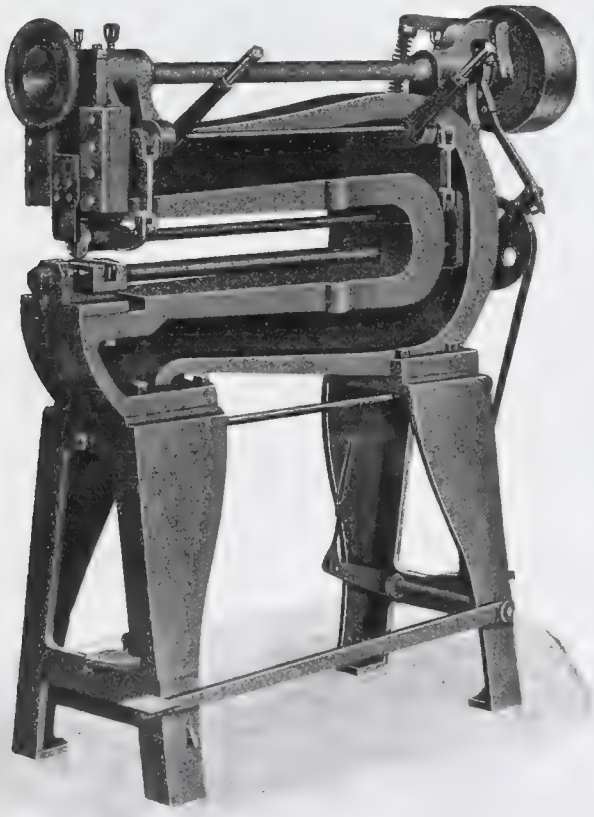
This machine automatically feeds the stock in a similar manner that cloth is fed into a sewing machine, and it is possible to cut to a line as easily as it is possible to sew to a line on cloth. The feed being absolutely under the control of the operator, it is possible to start and stop at any desired point in sheet or plate and change direction of cutting at will. The cutting device takes out a kerf, giving the same result in a sheet or plate that is obtained with a jig saw in wood, leaving a square, uncrimped edge to all material.

The cutting members are composed of a reciprocating tool which operates continuously when clutch is thrown in; a horizontal stationary member which, in conjunction with two lower feed rollers, practically forms a three-sided die. An upper feed roller under spring compression holds the stock rigidly in proper position, and by intermittent feeding of both lower and upper rollers the stock is advanced in regular stages and while the reciprocating member is above the stock.

This machine cuts very rapidly, being able to obtain a speed of thirty inches a minute in maximum thickness of material; the thinner the gauge of material the faster machine can run. The feed is geared to advance the stock 1-16 in. per revolution of fly-wheel. For technical work, or such with very complicated shapes, machine should run about 200 r.p.m.; for general work about 400 r.p.m.; in reasonably light gauge about 500 r.p.m.

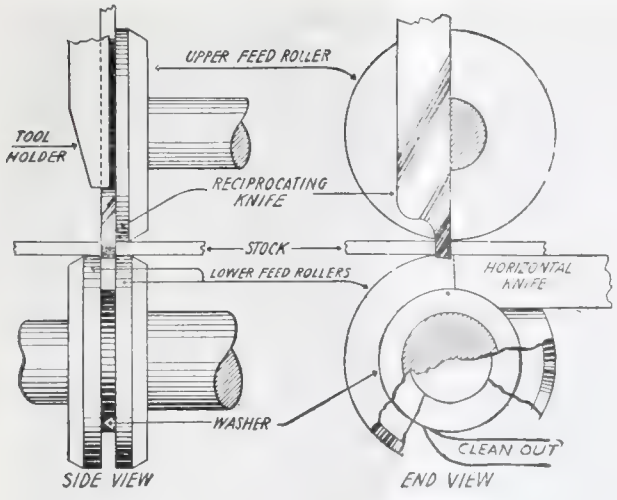
The feed is controlled independently of the cutting device, thus permitting the operator to gauge his work with precision. This control is obtained both from front and rear of machine, thus enabling the cutting of stock of unlimited length and limited in width only by depth of throat, which is 34 in.

The reciprocating knife is formed from a piece of best quality high-speed tool steel 3 1-16 in. by ¾ in. in section and 7½ in. in length, and held rigidly in position on one side and both edges by a tool holder, the upper feed roller giving support to other side. The lower end is shaped as shown in cut, on an ordinary emery wheel, and hardened in the ordinary manner. Uusually makers of steel furnish directions for obtaining best results in hardening their respective kinds. The end is ground at slight bevel, making an angle of about 85 degrees in relation to the perpendicular front edge of knife, thus giving the knife a slight lead into stock. The rear edge of cutting end, after grinding, has reduced



SHEET METAL CUTTER.

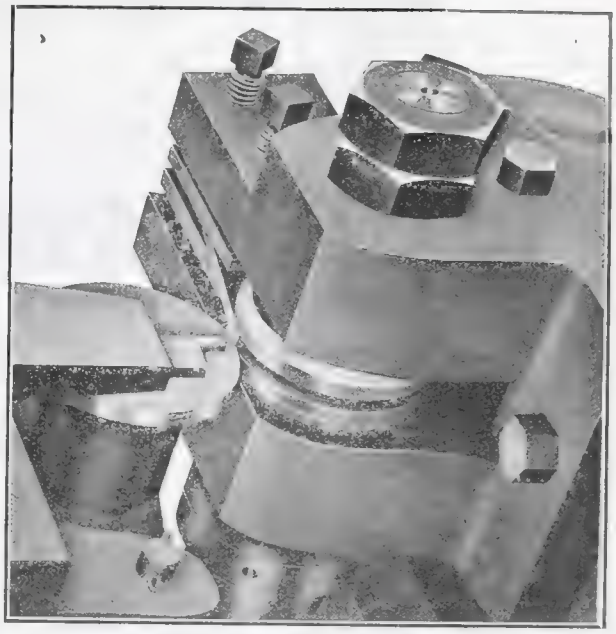
SHAPES CUT BY MEANS OF METAL CUTTER.



SECTIONAL VIEW OF CUTTER.

this portion to a section 3-16 in. by ¼ in., is slightly rounded off to give clearance to this part of knife, in making a curve or circle, the cutting being done by sides and front of knife only. The grinding of a knife in its entirety should not require more than three minutes, after a little experience. For adjustment of height of knife a set screw is fitted in top of tool holder immediately above knife, thus giving close adjustment of cutting point vertically, which, when knife is at lowest point should be about 1-16 in. below top of horizontal knife. This set screw also allows for re-grinding knife and again placing in proper position, having a travel of 1¼ in. vertically.

The horizontal knife is formed of the same kind and section of steel as reciprocating knife, and about 6 in. in length. It is shaped as shown in cut and hardened as above mentioned. It should be ground so that the top cutting edge is about 1-32 in. below level of highest point of lower feed rollers, when bearing on washer between lower feed rollers, and set forward of the cutting edge of the front of the reciprocating knife sufficiently to allow ordinary writing paper to easily pass between. It is held rigidly in position as well as properly adjusted by means of four lock-nutted set screws. The chips obtained by cutting process rotate with lower feed rollers, and by means of a tongue-shaped member having a chisel point with bearing on above-mentioned washer, are carried down an incline trough and to waste basket.



VIEW OF CUTTING MECHANISM

FLAT TAIL-CENTRE FOR PORTER CABLE LATHES

A great many users of the Porter Cable Lathes have found that on jobs having two or more diameters, material saving in time could be made by arranging a gang of tools so as to turn all of the sizes at one pass. Heretofore, this multiple tool system could only be applied to those jobs, the finished diameters of which were larger than the boss containing the tail spindle.

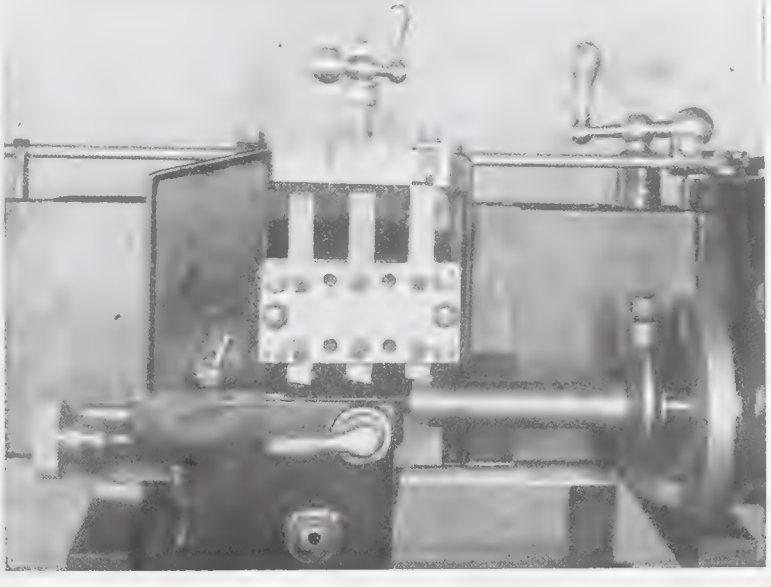
The Porter Cable Co., Syracuse, N.Y., have recently brought out a tailstock carrying a flat centre after the order of a grinding centre which permits handling multiple diameter jobs running as small as 5-16 in.

The illustrations plainly show the arrangement of tools and construction of the device which is applicable to any Porter Cable Lathe now in use, owing to the fact that a special fixture for grinding is furnished with each equipment.

CONSERVATION OF HEAT

Asbestos insulation between the courses of brick boiler settings reduces air leakage and conserves heat, which is usually wasted with the ordinary air space. Firebrick should withstand temperatures up to 3,000°F., but it conducts heat six to ten times as rapidly as asbestos felt. The smaller the air spaces in the insulation, the less the loss of heat by convection. High-grade asbestos fibres become brittle and start to disintegrate at 1,200-1,500°F., but the material does not go to pieces much below 1,800°F.

FLAT TAIL CENTRE.



FLAT TAIL-CENTRE FOR PORTER CABLE LATHES.

The MacLean Publishing Company
LIMITED
(ESTABLISHED 1888)
JOHN BAYNE MACLEAN, President H. T. HUNTER, Vice-President
H. V. TYRRELL, General Manager
PUBLISHERS OF

CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly journal devoted to the machinery and manufacturing interests.
B. G. NEWTON, Manager. A. R. KENNEDY, Managing Editor.
Associate Editors:
W. F. SUTHERLAND T. H. FENNER J. H. RODGERS (Montreal)
J. H. MOORE

Office of Publication, 143-153 University Avenue, Toronto, Ontario.

Vol. XXI. TORONTO, JUNE 19, 1919 No. 24

A Mechanical Triumph

THERE is much to be learned yet before flying across the Atlantic will become common practice. The craft that succeeded did well. Alcock and Brown met with difficulties, but they had one circumstance much in their favor, viz., the wind. The whole feat was a magnificent spectacle of cool, deliberate daring, of keen observation and of skillful flying.

But it was more than that. There is a feature that the public is apt to overlook in the wild plaudits it is heaping on the men who actually made the trip.

What made that trip possible? Largely the magnificent Rolls-Royce motors that supplied the power.

Have you heard any shouts for the mechanics who made those splendid machines? Have you seen anything of them in print at all? Not likely.

And yet that flight was not only a triumph of British daring and nerve, but it was a triumph of engineering skill and mechanical ingenuity. In fact, had the builders of those motors been less skilled at their trade, had the designers been less worthy, or the inspectors less watchful, there would have been no successful flight. There would have been no great Vickers-Vimy plowing through clouds, mist, sleet, now a few feet from the ocean's surface, and again ten thousand feet high.

It was workmanship that made that flight possible. The men who played a part equally as important as those who made the flight are unknown to the world at large. Their product is known and admired. But as far as the spectacular part of the victory is concerned, they have little share in it.

From this considerable distance, CANADIAN MACHINERY doffs its hat and salutes the designers, the builders, the inspectors—in fact, all who had anything to do with the turning out of the Rolls-Royce motors that drove that plane without a serious hitch, for over 16 hours at a speed of some 120 miles an hour.

Being Prompt in Business

HENRY B. THOMSON, of the Canadian Trade Commission, has not a particularly good impresison of the manner in which Canadians attend to business. He even claims that the sloppy methods as used by many of the firms are actually hurting the chances of Canadians securing business which, with more care and attention, might come to this country. Mr. Thomson says:

"It has been brought to our notice by several firms here that Canadian manufacturers and others are very lax in not replying to correspondence and enquiries, and it is having the effect of creating an impression that Canada as a whole is not looking for business, or making much effort to get it. Trifles of this kind create a false idea, as the people in the United States are very particular about prompt reply to enquiries, and furthermore carry on a regular follow-up course of correspondence Not only has it a bad effect in creating an impression of slackness, but it also causing some of the importers here to make strong representations to the Government to remove the import trade restrictions with other countries that are not within the Empire. At the present moment, Canada is, as you are well aware, particularly favored in this regard as compared with the United States, but if the representations of the importers are sufficiently strong and insistent, the Government will be forced to allow certain commodities to be brought in here on par with Canada, because these commodities cannot be procured, or apparently so, within the Dominion. Even if they have not got the stocks on hand, or do not deal in the commodities they are asked about, surely it would be a simple matter for them to write a note to the English firm enquiring and explain the situation to them."

One good way to kill business is to take a man's inquiry and leave it unanswered for a month or so. And one equally good way to create the impression that you are interested is to answer courteously and promptly. A half-dead concern can very often impart an impression of life by prompt action in dealing with correspondence.

Paying For the Frills

PERHAPS people require too much waiting on these days. And of course all this helps to chase up the cost of living. J. A. Leduc, M.P. for Westmount-St. Henry, told the Cost of Living Committee of the Commons that by conducting a "cash and carry" business and owning his own abattoir he was able to sell beef at a reduction of from 30 per cent. to 35 per cent. On other provisions by the "cash and carry" system he was able to sell at from 20 per cent. to 25 per cent. cheaper. For the best roasts of beef in small cuts he said he had not yet charged more than 30 cents per pound. He had only done so this year. Rib roasts he sold for 25 cents; shoulders, 15 cents to 16 cents; round roasts, 25 cents; brisket, 15 cents; shanks, 10 cents to 12 cents.

This same speaker blamed the telephone for much of the cost. People called for the highest priced cuts, believing they were the best. Then came the cost of delivering to them, all of which added to the cost.

One has only to stop and think for a moment to see light on this subject. Go around any of the department store stables and notice the number of rigs, autos and other forms of conveyance. Then on top of that, put the drivers, stablemen, mechanics, etc., and you have an outfit about long enough to run a fair-sized circus.

Costs the store a lot of money to keep all the outfiit going.

Not by any means. The store is not foolish. The customers who demand and use the delivery service pay for it, and customers who carry their material pay for it too, because there is no difference between the cost of carried and delivered goods.

In the mad rush that has taken place for business, dealers have encouraged the delivery system. They have been educating people to be lazy.

Stores are operating now that go to the other extreme, and they ought to be able to whittle some of the underbrush from the H. C. of L. forest. Upon entering you take a basket, wander around the store and help yourself, all goods being price-marked. Upon leaving your goods are taken from your basket and bagged; you pay the cashier and get out. You pay clerk and truck horse, and are entitled to a good-sized reduction on your goods. You are really helping to do away with that circus that has

formerly been kept up to trundle every pound and ounce to your back door.

You can't afford a rig to have a drive in, and yet you can afford a rig to have your purchases come in. Perhaps that is not a parallel case in all details, but the idea is there and it cannot be denied.

We are living in an age when frills and trimming are called for and where froth and bubbles have gained a commercial value. For all this we kick as we pay and pay as we kick.

A Baffling Proposition

WHILE in many instances it is comparatively easy to determine the direct cause of boiler failure and explosion, the history of the events leading up to the rupture are more or less obscure and somewhat difficult to determine. Such seems to be the case in the recent explosion at Newmarket, where five and possibly more lives have been lost. The boilers themselves, made by one of the most widely known firms, embodied careful workmanship and were far removed from the type of boiler usually featuring in such accidents. Monthly cleaning-down seems to have been practised, inspection was in the hands of a reputable insurance company, and the boiler at the time of the accident was notably free from scale and evidences of corrosion.

The failure in itself was due to a crack existing in the rear head of one of the drums and which extended, roughly speaking, throughout that part of the circumference below the water line. The remainder of the head showed, by the tear made when it parted company with the boiler, the excellent quality of the steel and its freedom from flaws.

While the immediate cause of the explosion is easily determined, it is in the history of the crack that the true explanation of the accident must be found. The location of the crack immediately outside the rivet holes, and the entire absence of pitting or other forms of corrosion render usual explanations untenable, and the character of the flaw which indicates crystallization necessitates other considerations.

Of late years obscure chemical phenomena occurring in the operation of boilers have received attention, and it is possible that the embrittling action of sodium salts through the action of liberated hydrogen caused the initial failure of the plate.

Trouble has been experienced elsewhere due to this cause, and if such failures become prevalent it will add one more burden to the load of vigilance carried by the operating engineer.

The Development of the Oil Engine

THAT the internal combustion engine is destined to take a very prominent place in future marine design, is becoming daily more apparent.

Repeated good performances of this type of motor are gradually overcoming the conservatism of shipbuilders and owners, and a striking instance of this is shown in the latest addition to the fleet of the Glenn Line, Ltd., Glasgow.

This company had already four vessels equipped with internal combustion engines, but the fifth, the "Glenapp," is larger and faster than any motor cargo ship hitherto built.

The "Glenapp," to which reference was made some time ago, is 470 feet over all by 56 feet beam, and moulded depth 36 feet 6 inches. Her gross tonnage is 7,260, so that her deadweight will be about 10,000 tons.

The engines, of the Burmeister & Wain type, built by Harland & Wolff, under license, are two in number, each developing 3,200 I.H.P. The B.H.P. is about 2,600. They are of the four-cycle type, eight cylinders to each engine. The speed is low, 125 rev. per min., the cylinders being 760 m.m. (about 30 ins.) bore and 1,100 m.m. (about 43⅜ in.) stroke. The fuel injection air is provided by a three-stage vertical air compressor on each engine, and there is an auxiliary air compressor driven by a 100 H.P. motor.

All the auxiliary machinery on deck and below is electrically driven, the current being supplied by three generators of the direct current type, running at 220 volts. Each of these is coupled direct to a 320 H.P. four-cycle Diesel engine, running at 210 R.P.M.

On a consumption of 24 tons of oil per 24 hours, including auxiliaries, a loaded speed of 13½ knots is maintained, and when light, 14½ knots.

The engine room staff consists of eight engineers, six greasers and three electricians.

Some people persist in looking on the oil engine as a passing fad, but every day brings proof of its ever-increasing use by far-seeing owners.

THE real pleasure and lasting joy in business is not in gouging the public and making undue profits. The man or firm going through life with a dollar glued to the eye misses the best. "What can I do for you?" is a much better slogan than "What can I do you for?"

* * *

IT'S A caution what an interest some folks take in the tariff. The chap with a couple of heads of cabbage and a row of onions is powerfully concerned over the rate on agricultural implements.

* *

SOME of those whose pay envelope depends upon their ability to write newspaper headings must make a great and a generous living. The Cobalt *Nugget*, for instance, upon reading that the Government was able to buy steel plate for $2.75 against a previous $3.25, announces: "Price of Steel Plate on the Toboggan." The fact is that steel plate was deliberately taken from 3.25 per pound to 3c, and later, on March 31, to 2.65. There was no toboggan or panic about it, simply an attempt to get away from war levels as quickly as possible.

* * *

THE packers and the butchers have adjusted their differences. All of which, being interpreted, means that the dear general public can look out.

* * *

A DETROIT man has quit the pulpit because the world does not want the gospel as he wants to preach it. The world has been preached at until it's black in the face, and what it wants is some church members who will measure up to the preaching that is done to them.

* * *

THERE'S no chance for any reduction in the price of coal, and coal dealers are even advising people to burn egg coal in their furnaces. Firing the average furnace with egg coal is about as entertaining and as unsatisfactory as eating peas with a knife.

* * *

HAVING won the war, and made the world safe for democracy, the nations are now doubling up their standing armies and looking over the new designs in guns and munitions.

* * *

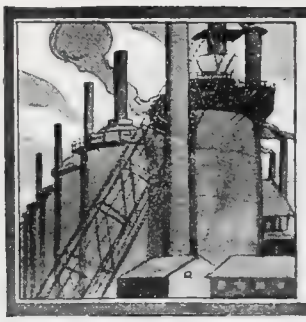
TORONTO relief firemen, boiler washers and helpers, chemical attendants, outside attendants, outside coal and ash men presented to the mayor a request for an increase in their weekly wage from $25 to $28 a week. Old H. C. of L. is always hanging around, waiting to lead in a new deputation.

* * *

A SUGAR refinery in Montreal hastens to deny that it has any labor trouble. Conditions are as sweet as the product of the factory.

* * *

THE chap who advertises a horse and sleigh for sale, when the thermometer is hangin' its head against the 90 mark, is our idea of a bang-up, honest-to-goodness optimist.



MARKET DEVELOPMENTS

Certain the Market is Not Going Lower

Steel Men Contend That the Low Point in Operation Was Touched Toward the End of May—There is a Decided Improvement in the Scrap Metal Market, Owing to Better Conditions in United States

THE settlement of the strike of the metal trades in Ontario centres is a much-desired matter just at present. There are some places where they have turned from war lines to peace products, and for some months have been engaged in making purchases and getting the equipment ready for manufacturing. This work has been pretty well completed now, and the lining up of the equipment has been finished. Some of the firms which have need of tool room work are sending it out of the strike district, even to points across the line, in order that they may be ready to get production as soon as possible once the strike is settled. These delays are going to keep back production at a time when the market is good.

Buying is not in as great quantities as had been hoped for. The small shops are not buying to any great extent. Many of these are constant customers of the warehouses. They do not carry any stock of their own, but the daily turn-over of the large warehousing firms is being affected by the dropping out of the small shops. The larger places are still buying, for the most part, pretty much on a hand-to-mouth basis, waiting for more settled conditions to come to pass.

Prices, through all the period, remain steady. Steel salesmen are more certain than ever that there will be no sag in values. They believe that late in May saw the mills at their lowest level of operation, and they hold that now that this period has been passed, any movement will bring values to a higher level. There is a good deal of room for argument here, as the mills are still quite a distance from capacity operations. There is still some shading of prices, but it is held that this is added evidence of strength, in that it has been accomplished without anything that looks like a landslide in prices.

The scrap metal market is showing a decided improvement. Most of this is due to the fact that United States is just now taking large shipments from some of the larger Canadian yards, and will continue to do so. Brass and copper are in demand, and there is some added strength to steel and iron.

It cannot be said that the Canadian situation is gaining strength in itself as rapidly as that in U.S., but it is benefiting from it.

MONTREAL WANTS TO HAVE THE LABOR TROUBLES SETTLED BEFORE BUYING

Special to CANADIAN MACHINERY.

MONTREAL, Que., June 19.—Despite the fact that optimism dominates the industrial situation, the present actual business is only of normal proportions, and future developments, if contemplated, are receiving little more than passive attention at the present time. It is not unlikely that the near approach to the signing of peace is an important influence in the deferred expansion of domestic activity, and the opening of those reconstruction plans that have been expected since the beginning of the year. Still another factor that adds to the complex nature of existing conditions is the uncertainty that surrounds the labor situation. Strikes are still of daily occurrence and the general unsettlement that prevails handicaps the manufacturers from establishing a basis on which to branch out on any new enterprise. As long as the element of strife permeates the industrial life of the country, sound progress must bide her time.

Steel business cannot be said to have shown much improvement, although some reports of a favorable character have been received from dealers. What sales are being made are invariably of small volume and for prompt delivery; future business of a new nature is almost nil. The hope is expressed that business will show a gradual improvement during the weeks following the final peace settlement, but on the other hand there are those that maintain that the better adjustment of labor troubles is essential before any permanent expansion can be consistently carried out. It has been stated that American business is picking up and that mills and furnaces are slowly increasing their production, but as yet this has had little effect in the Canadian market. It is almost conceded that stability of present prices is assured and that any changes will be in an upward direction. Slight fluctuations are not impossible but a general lowering of prices is, apparently, out of the question. Dealers in metals would not be surprised to see a stronger market in the near future owing to the better inquiry that has developed during the past week. The suspension of operations in many of the industrial trades has reacted on the machine tool business and tool sales have fallen off. Scrap is improving again and quotations reflect a stronger market.

Improvement Looked For

While the week's activities have not been of a character that would indicate that business is better, the undertone appears to be one of those that precede a greater demand. This is not due to the local situation but rather to the developments that are taking place across the line, a factor that is invariably followed by activity here. The better inquiry is already showing itself and the week will probably develop some interesting features. No price advances are noted this week but it is not unlikely that an upward revision may be made next week.

Strikes Affect Tool Demand

The effect of the country-wide strikes in the various trades is not conducive to

increased business. The movement of machine tools and supplies has shown a slight falling off, and what scattered sales are made are invariably arranged where tools are in stock or can be had on very early delivery. Volume of business is comparatively light, and seldom is an order placed for more than one or two machines to one customer. It is reported that some firms are contemplating advances where recent reductions were made owing to the continued and often increased cost of production. Few now look for any marked return to 1914 conditions, and when the uncertainty of the peace treaty is disposed of the attitude of labor and their demands will create a new factor that will renew the difficulty in the ultimate solution of the industrial problem.

Scrap Improvement Again Returns

Following a week of comparatively light activity, the movement of old materials is again assuming larger proportions, and sales are more regular and of greater volume. The local demand is still normal, and the bulk of the growing business is for export requirements, many of the sales going to the United States centres. The consumption here is still light owing to the low operating capacity of many of the mills, but the American mills, apparently, are increasing production, and scrap requirements are consequently an incidental factor. The tone of the market has created a better feeling here and the consumers of scrap are taking a renewed interest in present developments. The greater portion of the present sales appear to be in the metals, with coppers leading. The week's advances on copper range from one cent on light to 2½ cents on heavy and wire, the quotation range being from 12½ cents for light copper to 16½ cents for crucible. Red brass has advanced 2 cents and is now quoted at 10 cents per pound. Yellow brass turnings at 7½ cents shows an advance of one cent per pound. Light and medium brass are now 6 and 8 cents respectively. Leads are up ½ cent per pound. Heavy melting steel has been moving more freely and dealers are quoting $10.75 per ton, an advance of $1 per ton. Machine cast iron is up $3 per ton. the current price being $18 per ton. Wrought pipe has jumped from $6 to $8 per ton. Stove plate shows a similar advance, the quotation being $14 per ton.

BUSINESS REMAINS GOOD AROUND HERE

Although Strike is Making it Hard to Get Production in Some Lines

DEALERS report a fair amount of business during the last week or so. None of them claim that things are exceeding their expectations, yet on the other hand, none of them are willing to admit they expected things to be much better. The strike is still holding back considerable nice business, and is sending work into channels that will mean quite a considerable loss to the shops in this district in weeks and months to come.

POINTS IN WEEK'S MARKETING NOTES

Although bidding for pig iron business is fairly brisk there is a feeling that prices are going to hold.

—

Scrap metal prices look about due for a rise, there being an especially good demand just now for copper and brass.

—

One of the big problems the U.S. machine tool dealers have to attend to just now is to bid against their Government in the sale of machinery. The Government has a lot of material, taken from warships, but little used.

—

The steel market, it is contended, shows added strength by reason of the fact that the shading and cutting done on certain contracts have not produced a general decline.

—

It is probable that some point in May saw the low mark at the steel mills. Reports are to the effect that there is big business ahead once the difficulty of "getting started" has been overcome.

—

Scrap metal dealers assert that now is a good time for foundries and mills to buy scrap as they look for higher prices shortly.

—

The strike of metal workers is holding up developments in several lines. In some cases work is being sent to points not affected by the strike.

The Machine Tool Market

The small order is what provides the greatest amount of business just now. The railway shops ought to be ready to place a lot of business for which specifications have been out and tenders placed some time. Automobile plants have also been buying machinery. But the strike is the question that is making the most difference now, and its settlement is more anxiously looked forward to than for some time. Some of the firms have decided that they will not wait for the trouble to be settled here, and have sent their work out of this district, some of it across the line, in order that their plants shall not be held up when it comes to jig and fixture work.

Dealers here are not at all anxious to see any more used machinery from war plants come into the market here. There are opportunities to buy from some of the American plants at pretty attractive prices, but the feeling is that the Canadian market has had about as much of this material as it could well absorb, and that it would be better for all to let the U.S. market take care of the war shop material that is being taken out of its shell shops.

The manner in which this trade is affecting American markets was stated to CANADIAN MACHINERY to-day by a traveler for one of the large American manufacturers. "There is an immense amount of this war material on the market yet," he stated, "and it is keeping us pretty busy to know how to meet the situation. The thing is quite different to the Canadian shell shops. In this country your shops were run night and day for month after month, and there was some real wear and tear on the machinery. The shops in Canada got big production for a long time. Things are different in many of the U.S. shops. There the plants were just being put into shape. Many of the machines had never done more than a few operations. Some of them, many in fact, had never been taken out of the crate. I met a man in Rochester just the day before I came over here," he went on. "He was in the market for some surface grinders and other machines and I thought he was a sure sale. But he was going down to New York to look over the Government machines, a list of which had been furnished to him. I knew I would have to cut pretty close on the price to get him thinking away from the Government material, so right off the bat I put down a figure that was really lower than I had any right to go. He smiled and said he could buy the same machine from the U.S. Government, crated and never used, for a much lower figure. Of course I told him to go to it. I would have done the same thing under similar circumstances. The machine he will get will be the same machine I would have sold him, but I could not get near his price." Continuing along other lines in relation to machine shops in U. S. the traveler gave it as his opinion that some of the railroad shops, when they were returned to their owners, would be pretty well disorganized, he claiming that the manner of doing business in them was slack, and that the systems that many of the roads used were more or less in disuse.

In Steel and Iron

Some of the warehouses are feeling the effects of the strike, but none of them are complaining about the volume of business that is coming their way. The little shop that does not carry stock at all is the chief contributor to the sum total of business done by the warehouses. He is missed these days. His rig does not take away a big load but it comes almost every day. Some of the cities of the province are buying well just now. They have good business on their books and are buying liberally. There is a lot of material being used in the work on the Welland canal just now, and there are some operations there that bring the lifetime of much of the material even down below the supposed minimum. It is estimated, for instance, that each month will see at least $25,000 worth of wire rope used up on the dredges, many of which are work-

ing right down in hard pan under very heavy strain. Of course it is necessary to keep a good stock of this material on hand, otherwise operations would be held up.

The Imperial Oil Co., at Sarnia, are having considerable work done for them, and this calls for a big supply of tubes.

Dealers still insist that they see no chance of the steel market breaking. In fact reports that are coming in from the big rollers indicate that were any change to be made, it would be toward a stronger rather than a weaker market.

Better Reports in Scrap

Although there is not sufficient added strength in the scrap metal market to warrant dealers in marking up the prices, the chances seem to be that if the improvement continues this will have to be done. The greater part of the improvement though, is in the United States market, which is just now taking quite a lot of material from some of the larger yards in this country. Dealers hesitate to mark up the prices they are willing to pay because they fear they may have to recede later on, and they do not wish to do this. There is a large enquiry for copper and brass. Iron and steel is better in the U.S., but it cannot be said that the recovery has reached the Canadian market to any degree. The firms that are buying here are still working on a hand-to-mouth basis. Dealers here state that if the Canadian foundries and shops are in a position to buy for future needs, right now is the best time, as they are certain that prices will not come to any lower levels, and there may even be a scarcity in some lines if the U.S. demand continues to take large shipments from the yards here.

Another lot of U.S. shell steel scrap was disposed of this week. Dealers claim that the policy followed by the U.S. authorities is the right one. They dispose of the scrap in lots, depending on its location. In this way they are getting rid of their material without throwing the market out of joint or disturbing the prices.

PITTSBURG SAYS THE BIG WORRY IS "TO GET STARTED" IN BUYING

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., June 19.—Production of steel ingots in May was at the rate of about 26,450,000 gross tons a year. This represented about 45 per cent. of capacity, against 65 per cent. in April, 77 per cent. in March, 85 per cent. in February and 87 per cent. in January. The improvement in the buying of steel began about the second week in May, and this improvement caused somewhat heavier production of steel, even before the end of May. The increase does not show in the monthly statistics because previously production had been declining so sharply. It is probable that at some time in May the rate was down to 50 per cent. of capacity, perhaps in the third week of the month, but with the heavier buying for more than a month past there has been a gradual gain and the rate at present may be estimated as being about 60 per cent. Unless midsummer conditions cause a material slump in production, as the market is almost invariably dull in July and August, the low point in output in May, say 50 per cent. of capacity for a part of the month, will pass into history as the record low rate after the war. It is almost the universal opinion that there is a period of several years of great activity, say from five to ten years, ahead of the trade, the main difficulty being in getting started.

Steel Corporation Tonnage

The Steel Corporation's unfilled obligations at the end of May amounted to 4,282,310 tons, representing a decrease of 518,375 tons during the month, while the decreases in the preceding four months had averaged slightly more than 600,000 tons a month. The May decrease represented about 38 per cent. of the month's capacity, and as shipments were about 58 per cent. of capacity the new bookings appear to have been only about 20 per cent. of capacity, the smallest for a great many months.

Such a showing appears decidedly unfavorable, and certainly out of keeping with the universally admitted fact that the steel market began to grow more active before the middle of May. The difficulty lies with the Steel Corporation report, which includes contracts. Trade practice has been, as to many contracts, that the buyer could specify or not, as he chose, the mills usually cancelling unspecified quotas at the end of the quarter, and sometimes, in recent years, at the end of each month. The contract does not produce mill operation except as it is specified against. The Steel Corporation booked very little contract business in May, and only a very moderate amount of strictly new business in the form of shipping orders. On the other hand, it received specifications, or shipping orders, against contracts in much larger volume than in April. It is learned in well-posted quarters that the actual shipping orders received in May, in new orders and in specifications against contracts, amounted to fully 75 per cent. of the month's capacity. This enabled the Steel Corporation to increase its mill operations somewhat in the latter part of the month, and there has been a slight further increase this month. Yet the monthly report of "unfilled tonnage," which has been given out regularly for many years, made a very poor showing. Sometimes, on the other hand, it makes what appears to be a good showing when fundamental conditions are not nearly as good as is thus suggested.

Steel Prices

In some quarters it is claimed that there is less shading of steel prices than formerly, say a fortnight or a month ago, but these claims are to be doubted. There is probably about as much shading as formerly. The market, nevertheless, may be said to be on a safer foundation for this reason, that the price cutting does not precipitate a general decline. Earlier in the year many producers, if not all producers, had the idea, perhaps a correct one at the time, that if there were any price cutting it would precipitate a break and the whole bottom would fall out of the market. That was why they embraced Secretary Redfield's proposal, afterwards called "price stabilization" in February, because they hoped it would enable them to agree among themselves as to prices, but lost all interest in the matter when about April 1, the Attorney-General rendered an opinion that the whole procedure would be in violation of the Sherman law.

Price cutting, where it exists, rarely runs to $4 a ton, and is more commonly about $2 a ton. Claims are that the great bulk of the business is placed at regular or March 21 prices, but one should not feel too secure about this.

A marked improvement has occurred in the buying of merchant steel pipe, which has been one of the laggards among finished steel products. Since about the first of the year oil country goods have been in excellent demand, and now some of the mills are fully sold for two or three months, one or two being actually behind in deliveries. With the larger demand for merchant or ordinary standard steel pipe the pipe mill operations are much better rounded out.

Sheet Buying

While demand for sheets has been moderately good since the first of the year, averaging fully up to the general run of finished steel products, there has been a gradual further improvement since the fore part of May, when buying was rather light. The buying is more widespread in character. While the leading buying interest is still the automobile trade, some other classes of buyers are coming more to the front, particularly in black and blue annealed. Galvanized sheets continue to move very slowly. Despite the great campaign of road building that is supposed to be in progress the demand for galvanized corrugated culvert stock is conspicuously light. It is said that more than 80 per cent., and perhaps 90 per cent., of the sheets bought are at full prices, 4.35c for black, 6.70c for galvanized and 3.55c for blue annealed.

Pig Iron

Pig iron is perhaps a shade stronger. Of course there is no advancing tendency, but there is somewhat less disposition on the part of certain furnaces to cut prices. This cutting arose largely from furnaces going outside their regular districts in order to eke out on the limited demand from their regular trade, and with more buying by their regular customers these furnaces are less dis-

posed to go outside their districts. The Cleveland furnaces, for instance, are now making few if any offers in the Pittsburgh market, which should normally be supplied by the valley and scattered Western Pennsylvania furnaces. It looks now as though the prices of March 21 would hold fairly well, with such declines as certain districts must have to make a regular price structure. The war time prices did not recognize the differentials that usually obtain between districts. Birmingham iron, for instance, has declined about $3 a ton, whereby it can now penetrate some northern markets in competition with northern furnaces.

U.S. MACHINE TOOL MARKET IS BATTERED WITH SECOND-HAND STUFF

Special to CANADIAN MACHINERY.

NEW YORK, June 19.—There is no broadening of demand for machine tools, but a fair business is being done in some lines. It is undoubtedly a fact that the dumping of hundreds of used tools on the market is affecting sales of new tools to a considerable extent, but there is no tendency to become unduly pessimistic over this condition, because it is realized that the second-hand tools must eventually be absorbed and machine-tool builders would like to see them removed as a market factor as quickly as possible. The high prices of new tools are causing many prospective buyers to look about carefully for slightly used tools which will answer their requirements. None of the tools of the Ordnance Bureau of the War Department have yet been placed on the market, and latest reports indicate that these will inventory from $50,000,000 to $75,000,000. Private manufacturers, however, are offering used tools, the latest offering being from the Savage Arms Corporation, all of whose plants were 100 per cent. engaged in war work. The tools which this concern has to dispose of are valued at about $1,000,000. The Bureau of Aircraft Production, War Department, and the Emergency Fleet Corporation, have many hundreds of slightly used tools to sell, and their stocks are being looked over carefully by many prospective buyers.

Protest Against Policy

Strong protests have been made by machine-tool builders in the Cincinnati district against the proposed policy of the United States Government in dumping surplus machine tools on foreign markets. A resolution signed by 20 prominent machine-tool builders has been sent to Ohio representatives and senators says: "Please do what you can to prevent dumping of Government machine tools on foreign markets, as it will seriously affect every machine-tool plant in Cincinnati and the country at large. Truck manufacturers stopped this, why can't we? If surplus machines must be disposed of, why not arrange that Germany and Austria absorb them in their initial requisitions?"

The most active machine-tool markets are those of Detroit and Chicago. In all of the present buying the automobile industry continues to figure as the most important factor, as has been the case since the signing of the armistice. Other industries are beginning to buy, but the effect of this has been by no means important as yet.

Prices are being fairly well maintained, and while some concessions are occasionally granted to obtain desirable business, there appears to be no possibility of further general reductions of machine-tool selling prices by the manufacturers.

Chairman Hurley of the United States Shipping Board has cabled from France that 200 ships for France are to be built in American shipyards. It is thought here that this relates to the contract closed by the Foundation Co., New York. The Pacific Coast plants of this company were being dismantled and the machinery was to be shipped to France, where the ships were to be built. A few weeks ago, however, work was stopped and it was reported that arrangements probably would be made to build the French ships in the United States.

U.S. MARKET IS FIRM IN SCRAP NOW

Dealers Are Inclined To Hold Scrap Looking For a Rise Later On

THOUGH no very great volume of business is being done, prices are holding firm and the general feeling seems to be that better times are at hand. Following are the reports by districts:

Chicago.—With dealers holding most of the scrap, consumers are buying for immediate needs only. Prices remain firm but any considerable buying would have the effect of raising them. Government and railroad offerings are being absorbed easily.

Cleveland.—Trading has been confined to odd lots, the market generally being deadlocked. Consumers are offering prices below the market, and dealers are holding for prices better than those now prevailing. Some heavy melting steel has brought $17.

Philadelphia.—Prices are showing advances in various grades in this district. Heavy melting steel is quoted at $16.75 delivered. Cast iron turnings have advanced to $10.75. Foundry scrap is in good demand and scarce.

Pittsburgh.—An increased enquiry and small inclination to sell on the part of dealers has resulted in prices getting stronger. Heavy melting steel is expected to reach $18 at the first sign of real buying. Other grades are also firm.

Buffalo.—The market is showing increased strength over last week's prices, and dealers confidently predict $20 for heavy melting steel in the near future. The Government steel held in plants here is attracting much interest, a quantity of 20,000 tons at the Lackawanna Steel Co. being available for sale if the Government desires to put it in the market.

New York.—There is not much doing in the scrap market in this district. What there is is confined to heavy melting, turnings and borings. Prices are holding fairly well. Government scrap is being sold on bids, a good sized tonnage being closed.

St. Louis.—Prices here show an advance in all grades from one half to one point. Railroad offerings were actively competed for and brought good prices. Feeling is better than at any time since the recent slump.

Cincinnati.—Conditions are favorable to the scrap market, and prices show a slight improvement. The moulders' strike has been settled, and this will mean a better demand. The Pittsburgh steel interests are expected to enter the market shortly.

DISPOSING OF THE SURPLUS STOCKS

Sir Joseph Flavelle Has Been in England Trying to Wind Up Munitions Board

Sir Joseph Flavelle, chairman of the Imperial Munitions Board, has sailed on the Aquitania from London for Canada after a month's visit. Sir Joseph was engaged in winding up the affairs of the Munitions Board as well as attending to his own private interests. The main question has been the disposal of the surplus stocks of different materials on hand at the end of the war. There are very large quantities of iron, steel, copper, brass and lead as well as explosive constituents.

The Canadian trade mission in London has been endeavoring to dispose of these stocks, but the task has not been an easy one. The market is naturally overstocked with these materials and even for iron and steel for agricultural purposes there is scarcely any market. It was thought Germany and Austria would take quantities of copper and brass, but there are, of course, difficulties about payment. The trade mission is also assisting the overseas military authorities in the disposal of certain army property, such as shoes, etc. One item in the army property list that is giving no trouble with regard to disposal is motor cars. The Government has been selling these in Britain and actually realizing more for used cars than was originally paid for them, the price of motor cars in Britain being at present just about twice that in Canada.

NICE LOOKING SQUABBLE LOOMING UP OVER THAT SHIP PLATE CONTRACT

OTTAWA, June 19—At the request of the Government, construction on the new plate mill at Sydney has been stopped for the present. This somewhat unusual action leads to speculation as to the reason. By the terms of the contract for plates between the Government and the Dominion Steel Company, the making of ships' plates was to be begun in November. It was seen some time ago that it would be a physical impossibility to have the machinery installed by that time, and the manufacture of plates begun, as the frames of the mills are not yet completed; and as the price had fallen much below the contract price which was to be paid the company, it was generally anticipated that the Government was offered a good opportunity by this expected default to get rid of an unsatisfactory contract. By asking the company to cease further building operations for the present, it is possible that the latter is given an opening, of which they may be assumed to be wide enough awake to take advantage, to place the onus for the delay on the Government, and claim the full advantages of their contract.

At present the Government is getting its plates from Pittsburgh delivered at Halifax for a price of $3.50 per hundred pounds, as compared with the basic price

(Continued on page 60.)

S. F. BOWSER COMPANY, LIMITED, TORONTO, ONT.
Manufacturers Oil Tanks, Pumps and Storage Systems, organize as Canadian Company
April 1st, 1919

THE above, one of Toronto's live manufacturing firms, has just recently reorganized, to operate as a strictly Canadian organization, financed and managed under Canadian control.

S. F. Bowser Company, Ltd., has for a number of years been manufacturing and selling the famous Bowser gasoline and oil pumps, tanks and storage systems, under the control of the parent company at Fort Wayne, Indiana, U.S.A. Their Canadian business has grown steadily from year to year, practically their entire Canadian trade being supplied from the Toronto factory.

Believing thoroughly in and being enthusiastic about the future of Canada, this company decided recently to organize, under the Canadian laws, as a strictly Canadian firm, putting the management into the hands of their present efficient sales manager, Mr. H. C. Christie.

The illustrations shown herewith give a good idea of the present plant of the Bowser Company. This plant is of heavy construction and commodious, with large storage yard in the rear, having splendid railway facilities, and is amply equipped in all respects for taking care of the Canadian business. Last year their total Canadian business amounted to better than a half million dollars.

Mr. H. C. Christie, who has been for a number of years connected with the Canadian factory of the Bowser Company, recently as sales manager, has been elected manager with Mr. E. F. Cummings as factory manager. The other officers are: Mr. S. F. Bowser, president; Mr. S. B. Bechtel, vice-president; Mr. H. J. Grosvenor, secretary, and Mr. W. G. Zahrt, treasurer.

This organization stands ready at all times to assist users of gasoline and oils in solving their storage and distribution problems. A corps of engineers and draftsmen are kept busy planning and designing equipment for stores, garages, mines, mills, factories, railroads and other industries where oil storage is required. The Canadian Government, during its recent war activities, found use for Bowser product at a number of its important camps and aviation fields.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs. C.L.	L.C.L.
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$19 50	$19 25
Electro copper	18 50	18 00
Castings, copper	18 50	18 00
Tin	58 00	55 00
Spelter	8 50	7 50
Lead	6 50	6 50
Antimony	9 00	9 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$12 50	$11 25
Copper, crucible	16 50	14 00
Copper, heavy	16 00	14 00
Copper wire	16 00	14 00
No. 1 machine composition	12 50	13 00
New brass cuttings	9 25	9 00
Red brass turnings	10 00	9 00
Yellow brass turnings	7 25	6 50
Light brass	6 00	5 00
Medium brass	6 00	6 00
Scrap zinc	5 00	5 00
Heavy lead	4 50	4 00
Tea lead	3 50	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	10 75	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	17 00	15 00
Rails	12 00	11 00
Malleable scrap	12 00	12 00
No. 1 machine cast iron	18 00	15 00
Pipe wrought	8 00	5 00
Car wheels	20 00	18 00
Steel axles	20 00	20 00
Mach. shop turnings	5 50	5 00
Stove plate	14 00	10 00
Cast boring	5 50	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent.
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	.....
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	08½
Grits, 80 and finer	06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 30
Brass sheets, 24 gauge and heavier, base	$0 38

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

LeBLOND
HEAVY DUTY
Universal Millers

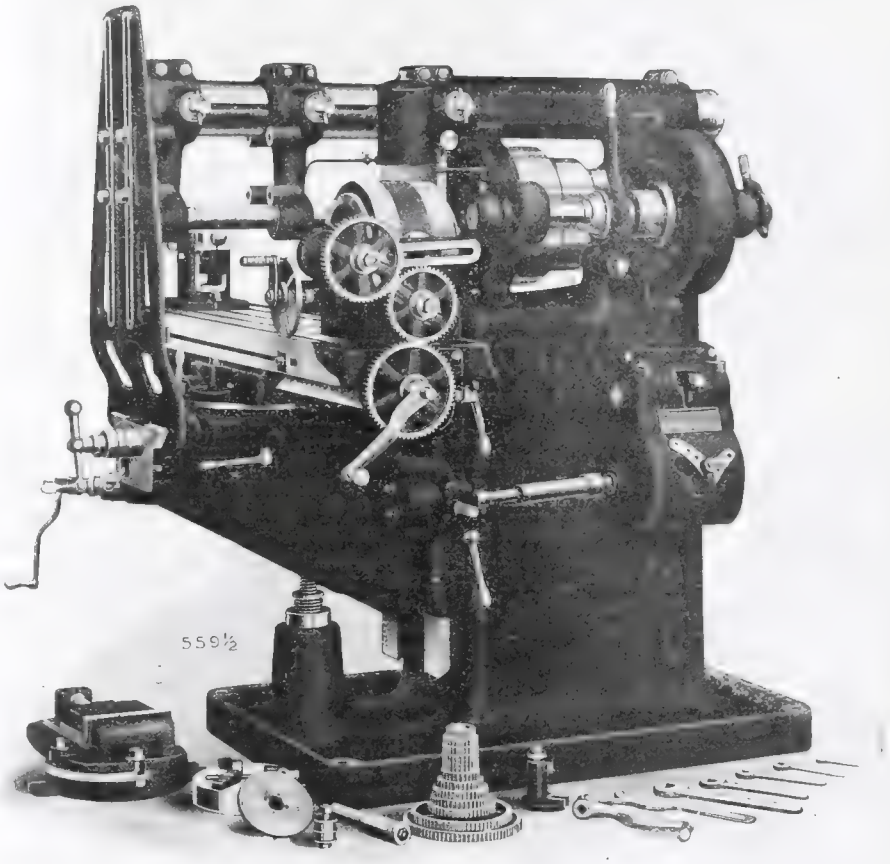
Are not only Tool Room Machines, but as a manufacturing proposition appeal to the careful buyer.

Their long life insures ample returns for the investment made.

May we explain to you their many advantages and the convenience of their control.

Carried in stock by

The A. R. Williams Machinery Co.
LIMITED
TORONTO



Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited
Steel Foundry Division, Lachine Canal
Head Office: 187 Delisle St. MONTREAL
Phone Victoria 1492

P⨯H
TRADE MARK

Taking the Guesswork Out of Files

You don't have to take your files any more on trust since P.H. and Imperial Files have been on the market.

Steel and workmanship are the best that can be procured, and performance and wear are guaranteed.

Your money back without question if they fail to stand up.

We know
"They Cut Faster and Wear Longer"
Let us prove it.

INGERSOLL FILE COMPANY, LIMITED
INGERSOLL, ONTARIO

JOHN MORROW SCREW & NUT COMPANY, LIMITED
INGERSOLL *Sole Distributors* ONTARIO

IMPERIAL
TRADE MARK

agreed on with the Dominion Steel Company of $4.15 at Sydney. The price to the Sydney company is subject to any reduction which may take place in the production of ingots. The Department of Marine and Shipping has power under its contract to put its accountants into the plant every six months after the supply of plates has begun to ascertain what the cost of ingots has been during the preceding half year. It is understood that there has been no reduction in cost recently, so no reduction in the price of plates may be expected from this source.

Although it is some weeks now since the company was notified that there must be some readjustment of the contract, the Department has as yet received no reply to its communication. Hon. Mr. Ballantyne informed me to-day that the matter would have to be adjusted satisfactorily without further delays, and he is pressing for a reply.

MINISTER SAYS C.M.A. DOES NOT GIVE INFORMATION HE REQUESTS

Special to CANADIAN MACHINERY.

OTTAWA, June 19.—At its recent meeting in Toronto the Canadian Manufacturers' Association passed certain resolutions regarding the necessity for an increase of shipping facilities by purchase, lease, or building, and forwarded the same to the Dominion Government. When this was brought to the attention of the Minister of Marine he showed some signs of impatience. "It is now about ten months, quite a time before the war ended, since I requested Mr. Walsh, the traffic manager of the Canadian Manufacturers' Association, to furnish me with a statement showing the amount of tonnage the association had or could secure for export business, when it would be ready, and from what points the shipments would be made. This was in order to give us an idea of what marine tonnage they would need. I have never had a reply to that request. I also made the same request to Mr. G. M. Murray, who said that he would see that the information was forthcoming, but that produced no more effect.

"It seems to me that the first thing for the manufacturers to do before passing or forwarding a resolution of this kind, is to send that statement asked for so long ago."

The complaint is very common in different departments having business with the Canadian Manufacturers' Association that there is a great deal of loose talking and urging about export business, and not enough concerted effort to secure it. The first move for the manufacturers is to circularize their membership as to the quantity of goods they have or expect to have, and when they will be ready for shipment. It is understood the C. M. A. was asked to give a statement to Mr. Hanna, of the Canadian National Railways.

I am told that a ship of the Canada Steamships, Ltd., recently loaded at Montreal for France and had to scour the United States for part of her cargo, otherwise she would have gone partially empty.

ABERTA TO HAVE A STOCK TAKING

Her Natural Resources Are to be Investigated and Placed on Proper Record

An intelligent stock-taking of the natural resources of Alberta is the real object behind the Alberta Industrial Development Association. This association works in conjunction with the Industrial Department of the Government of Alberta. Mayor M. A. Brown, president of the association, speaking to CANADIAN MACHINERY of the proposition, stated that it was the first time that such a movement had been attempted. Certainly the matter is being approached in a most thorough manner, and Alberta will be able to tell the manufacturers of the country just what they have there in the way of material, labor, fuel and transportation facilities. With this information in hand, the Westerners feel that the manufacturers ought to be able to judge for themselves whether it will be good business or not for them to locate there. There will be no attempt to encourage any lines that are not likely to succeed.

The work will include that of research, in order that the natural resources of Alberta may be listed. One of the first items will be iron ore. It is immaterial to Medicine Hat whether this is smelted in B. C. or elsewhere. The idea just now is to find where the deposits are in the West, and where the logical point is for treating them. Wider markets will be sought for the coal deposits, and in this connection it is likely that a new furnace, especially for burning Western coal, will be placed on the market. Several stove makers of the East are considering this matter. The various clay deposits will also be thoroughly analyzed.

Mayor Brown is organizing now also for the Industrial Congress, which is to take place from August 11 to 16. This will be in the form of a provincial tour, starting from Medicine Hat, going to Lethbridge. They will be in Calgary 13th and 14th, and then on to Edmonton. The week-end will be spent at Banff. Invitations are being sent to 18,000 manufacturers. Henry Ford has promised to attend, as well as Robert Dollar, Jos. Oliver, E. R. Erskin, Louis Hill, of the C.N.R.; E. W. Beatty, president of the C.P.R.; and D. B. Hanna, president of the National Roads.

The real motive is that Alberta shall have her natural resources catalogued in order that manufacturers shall see for themselves just what is offered there. Already the association, finding one of the large shell shops out of work at the end of the war, has been able to show that tractors can be made profitably, and these implements are now being turned out of the shop formerly devoted to munitions.

OPEN NEW BRANCH

Wm. B. Scaife & Sons Company, of Pittsburgh, announces the opening, on July 1st, of a Chicago sales and engineering office at 38 South Dearborn street, with Charles F. O'Hagan, formerly chief engineer of the company at Pittsburgh, as resident engineer and manager.

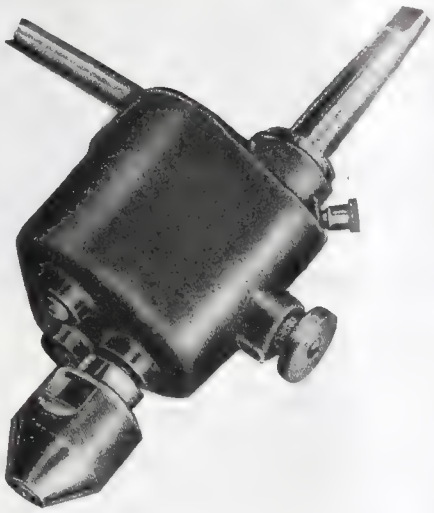
This company is the oldest manufacturing concern west of the Allegheny Mountains. During the more than one hundred years since their business was founded, they have from time to time, as conditions arose, added to their manufacturing facilities. They now manufacture black or galvanized, riveted, brazed or welded steel tanks for air, gas and liquids, steel shipping drums, range boilers, steel structures; also the well-known We-Fu-Go and Scaife water softeners and filtering equipment.

NEW KITCHENER PLANT

Mr. C. Rieder, who recently became president of the Ames-Holden-McCready Co., wholesale shoe manufacturers, has been in Kitchener, and yesterday made the announcement that the property of the late Ward Bowlby, consisting of about five acres of land on King Street West, had been purchased for manufacturing purposes. Mr. Rieder declined to divulge the nature of the industry to be erected, but it is generally understood that it is proposed to erect a large and up-to-date plant for manufacture of tires and other rubber goods.

Mr. Rieder intimated that building operations would commence within a few weeks, and that the new factory would be one of the largest of its kind in Kitchener. He declared that he looked upon Kitchener as the rubber centre of Canada, and this was why it was decided to locate the new plant here.

Export Conditions Discussed.—At the meeting of the Canadian Manufacturers' Association the subject of export markets came up. Many of the members do not see eye to eye with Mr. Lloyd Harris on this subject, and feel that the home market offers enough business just now without going abroad to look for more. Mr. Bulman, the retiring president, said that he thought the British manufacturer still had the advantage over the Canadian. Mr. Harris of the Harris Printing Co., thought that the Dominion Government should establish consulates in foreign countries to facilitate export trade.



— *the secret of Lower Tapping Costs*

The expert hand tapper is a good man to have on your pay roll, but here is an attachment that will tap holes as quickly as they can be drilled, and **ten times faster** than is possible by hand. The action of the Wahlstrom Tapping attachment closely imitates hand tapping, because of the mechanically obtained **oscillating movement** and it greatly reduces tap breakage.

Try one and you are sure to want more. There is nothing about this attachment to get out of order and the quality assures a **long, lasting,** good service.

Takes taps of all sizes up to ½ inch.

Order one on trial, your money promptly refunded if you are not satisfied.

Send for Bulletin.

Aikenhead's Wahlstrom Attachment

AIKENHEAD HARDWARE, LIMITED
17 Temperance St., Toronto

Aikenhead's "Menominee" Motors

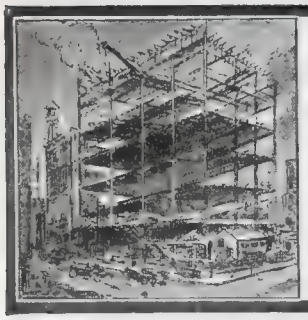
25 cycles, 110 volts. Single phase. In 1/8, 1/6, ¼, 1/3 and ½ Horsepower. Speed 1,450 R.P.M.

Type "A" Induction Motors

As illustrated are self-starting, quiet running. They will serve you well and long.

In Stock for Immediate Shipment.

AIKENHEAD HARDWARE, LIMITED
17 TEMPERANCE ST., TORONTO



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

ENGINEERING

Ottawa.—Contracts for the reconstruction of new lines and extensions of existing lines have been announced by the Canadian National Railways. The length of new lines to be constructed will be approximately 340 miles, all in the West and chiefly in Saskatchewan. It is understood contracts already have been let, and the work is to be rushed to completion. The contracts include construction for: The Amaranth extension, 35 miles, on the west side of Lake Manitoba. Melfort northeasterly line, 30 miles, in Saskatchewan. Humboldt-Melfort line, Saskatchewan, 32 miles. This is to complete this line. Eslin, southeasterly, 35 miles, in the lake country, Sask. Oliver-St. Paul de Metis, 22 miles, Alberta. Peebles, southeasterly towards Lampman, Sask., 20 miles. Hanna-Medicine Hat, Alta., 72 miles. Acadia Valley line, 25 miles, from a point a little southeast of Alsask, Sask., running westerly into Alberta. Swift Current extension, 27 miles. Luks Lake extension, Sask., southwest from Dumblane, 22 miles. Turtleford extension, 2 miles. This is the extension of the line, North Battleford to Turtleford.

MUNICIPAL

Chatham.—The Public Utilities Commission of Chatham has been advised that Chatham will now pay $29 per horse power for current, as compared with $30.87 before. There has been a big increase in power purchased from the Ontario Commission, and the new rate is the result.

Sarnia.—The purchase of a municipal paving plant was given a six months' hoist by the Sarnia City Council at a special meeting, and it was decided to readvertise for tenders for the completion of the resurfacing work on the paved streets of the city. The session was somewhat stormy and was replete with hints of influences, Bolshevism and threats of resignation by Ald. Kirby.

TENDERS

The Department of Railways and Canals is asking for tenders for the supply of sand, which will be received up till June 26. Specifications and tender forms can be obtained from the Chief Engineer of the department, Ottawa, and the engineer in charge of the Welland ship canal, St. Catharines, Ont.

The Lindsay Central Fair Association is asking for tenders for the erection of a new building. Plans and specifications by G. W. Gouinlock and G. W. King may be seen at the office of J. P. Ryley, secretary, or J. Carew, Lindsay, also at the architect's office, Toronto.

PERSONALS

Mr. William C. Wilson, of the William C. Wilson Co., is leaving for England the first week in July. Mr. Wilson's visit is in the nature of a business trip, and he intends to try and place a line of auxiliary marine machinery manufactured in Canada with British shipbuilders and shipowners. In the present congested state of the British engineering industries, Mr. Wilson sees a favorable opportunity to exploit Canadian-made goods. The lines include steering gears, winches, windlasses, accommodation ladders, etc., and all have the seal of approval of Lloyd's surveyors.

MARINE

Port Arthur.—The two ships that are now building at the plant of the Port Arthur Shipbuilding Co. for the Canadian Government, will be named the "Canadian Cadet," and "Canadian Adventurer," respectively.

Victoria.—The Nippon Yuson Kaisha steamer "Kature Maru" sailed from here for the Orient with a Red Cross party and an aviation party bound for Siberia. The Red Cross party consisted of doctors and nurses for the hospitals along the route of the Siberian railway. The aviation party consisted of twelve French airmen also for Siberia.

London.—The application of the Canadian Pacific Railway Company to transfer a number of their ships to Canadian registry is freely rumored here. Sir George McL. Brown admitted that he had heard of it. It is said that Chairman Bosworth has sailed for Canada to discuss the matter with the heads of the line there. This action is considered to be the great step in the formation of a Canadian mercantile marine, as it is expected that probably other lines sailing to and from Canada may follow the C.P.R.'s lead to some extent.

Victoria.—The yards of the Foundation Co. were the scene of another launching, when the steamship "Canada" was successfully launched in the presence of a large and distinguished company. Capt. Andre Millot and A. O. P. Francis, the French consul, were among the guests. Capt. Millot is the French High Commissioner, and has been on the coast some time looking after the various French interests. The "Canada" was the seventh of the wooden steamers to be launched on the present contract for twenty.

TRADE GOSSIP

The Metal Stamping Works of the Laval Industrial Co., of Laval, P.Q., was destroyed last week by fire; the loss is estimated at about $18,000.

$150,000 Fire at Newcastle.—The fire which broke out in the lumber storage of the Edward Sinclair Co. mill, near Newcastle, N.B., did damage amounting to about $150 000.

New Rolling Stock.—The Canadian National Railways are out to purchase twenty mail cars and twenty first-class coaches, the largest amount of rolling stock to be placed by any railway since the beginning of the war. The estimated cost of the cars is $800,000, about $20,000 each.

Electrifying Great Britain.—The British Government has definitely committed itself to the adoption of electricity for heating, power and lighting. The country will be divided into districts, each of which will have a commission having power to acquire electric plants and build others where they think necessary. Water powers will be used as well as steam plants.

New Railway Shops.—The new Canadian National Railway shops at Leaside, near Toronto, will be opened almost at once. The work of construction is practically completed, and some of the workmen are already on the premises. The plant consists of a roundhouse, power house, administration building, locomotive repair shop, car repair shop and transfer plant.

What is British Made?—There is a difference of opinion as to what is understood by British made. For instance, motor cars made in Canada, that is, with the exception of the engine, would be shut out of the British preference. The tariff of Canada recognizes any article which is 25 per cent. manufactured in Great Britain as being of British make, and negotiations are now going on with the British Board of Trade to have the same ruling apply with regard

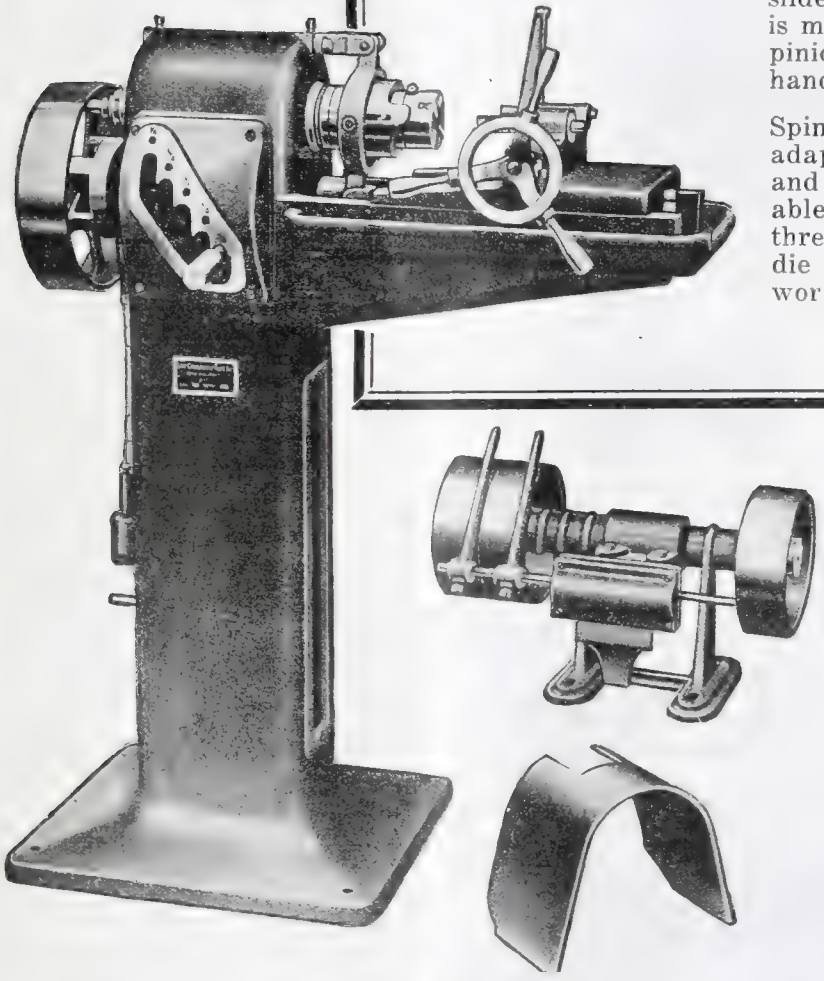
THE BETTER WAY

Just the way that suits. Small parts are most economically threaded with the Geometric Threading Machine. Busy automatic screw machines cannot profitably be slowed down to cut threads when there is a Geometric Threading Machine at hand. Especially since a Geometric Threading Machine costs one-tenth the price of automatics.

Geometric Threading Machines are employed on a large class of small threaded parts that cannot be produced economically on the ordinary screw machine.

Made in three sizes—to cut ⅛ to ½ inch, ¼ to ¾ inch, and ¾ to 1½ inch diameter threads. The carriage is mounted on slides and on the largest size machine is moved back and forth by rack and pinion, and in the smaller sizes by hand.

Spindle speed changes readily made, adapting the machine to the diameter and material of the work. An adjustable stop assures accurate length of thread, and automatically opens the die head, permitting of drawing the work straight back.



A line from you brings full details regarding this machine. Tell us your threading requirements — let us recommend the proper Geometric Collapsing Tap or Self-opening die.

THE GEOMETRIC TOOL COMPANY

NEW HAVEN CONNECTICUT

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

TRADE MARK
"HAWK" BRAND STEEL

REGISTERED U.S. PAT. OFFICE NOS. 50932 61384
CANADIAN PAT. OFFICE NO. 34

"HAWK VANADIUM"
TOOL STEEL

Remarkable in its glass Hardness, Toughness and Cutting Efficiency.

Will give twice the cut of a regular tool steel at one grinding.

Order "Hawk Vanadium" for your End Mills and cutters. Once known—always used.

Large Stock. Prompt Shipment.

Write for full particulars to

Hawkridge Brothers Company

Main Office and Warehouse:
303 Congress Street, Boston, Mass.
Storehouses Malden Mass.

STEEL
OF EVERY DESCRIPTION
SEND US YOUR ENQUIRIES

BLACK DIAMOND OVENS

OVENS
Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal.
Kernchen Siphonage Ventilators, Bakers Ovens, trucks, casters, etc
Write for Booklet
Brantford Oven & Rack Co., Ltd.
Brantford, Canada.

Machine Tools
FOR SHIPBUILDERS ETC. ETC
BERTRAMS LIMITED
SCIENNES EDINBURGH

to Canadian goods partly manufactured in foreign countries.

Moved to Toronto.—To make 200 range boilers a day and employ 300 men to start, the advent of the John Wood Manufacturing Co., of Conshohocken, Pa., into the industrial life of Toronto was made when the Chartered Trust & Executor Co. put through the deal for the purchase of the Holden-Morgan munition plant on Coxwell Ave., south of Danforth, for about $100,000.

New Directors.—It is officially announced by President F. G. Wallace at a meeting of the directors of the Canadian Locomotive Co., that M. J. Haney, president of the Home Bank of Toronto, and Jas. Carruthers, the well-known financier of Montreal, were elected to fill the vacancies on the board created by the deaths of President J. J. Harty and Senator H. W. Richardson.

Show Consideration

For Your Employees And They'll Show Their Appreciation In Increased Output Per Man

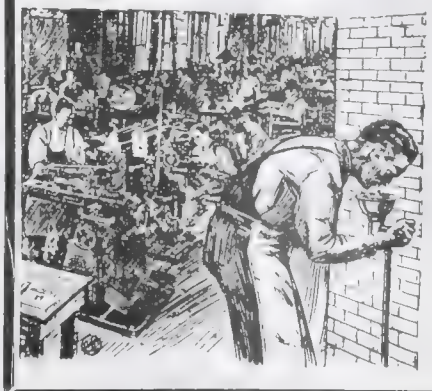
THEY MUST DRINK WATER
Give them pure, clean, fresh water through the

PURO
(MADE IN CANADA)
Reg. Trade Mark

SANITARY DRINKING FOUNTAIN

DRINKING CUPS ARE UNSANITARY. They spread disease among the employees and disable your organization.
Not only does "Puro" prevent sickness, but SAVES DRINKING TIME and reduces water bills 15% to 35%.
Tell us how many men in your factory and your water pressure in pounds.
We'll tell you just what it will cost to "PURO-FY" YOUR WATER SUPPLY.

Puro Sanitary Drinking Fountain Co.
Canadian Agents
McKENZIE BROS.
18 St. Alexis St., Montreal, P. Q.



Canada's Foreign Credits.—The credit of $25,000,000 which Canada is extending to Belgium is well advanced. The Canadian Pacific ocean service steamers have the contract for moving the goods, and the first sailing took place on June 14. The negotiations with France, leading to the placing of a credit with that nation, are held up for the present. Italy, who is receiving frozen meat from the Dominion, may also negotiate a credit here to cover the cost of these shipments.

Electric Furnace.—The Electric Furnace Co., Alliance, Ohio, has just shipped one of its standard nose tilting type furnaces to the United States navy yard at Washington, D.C., to be used in the Government brass foundry there. This furnace is provided with a motor operated tilting mechanism, and has a maximum hearth capacity of 2,000 lbs. The shell is 7 in. in diameter, and the furnace is rated at 105 kw. in electrical capacity.

The Hannifin Manufacturing Co., Chicago, have issued a catalogue descriptive of the Hannifin Aero chucks. This line of chucks and other air operated mechanism is unusually complete and the catalogue is replete with details of the various lines manufactured for use in the machine shop. The air operated chuck devised for the munition industry has found a valuable place in peace time manufacture.

Firm Reorganized.—The firm of John W. Gates, Ltd., of Montreal, has recently been reorganized under the name of the Gates Refractories Limited, for the purpose of manufacturing all kinds and shapes of high grade refractory bricks for furnace purposes. The company is now capitalized at $250,000; a plant has been acquired in Montreal East for $25,000, and the erection of kilns and the installation of equipment has already commenced. Operations will be started within the course of a few weeks.

Commissioner Chisholm's Remedy.—Riverdale and other parts of Toronto have been suffering considerably from the effects of the soot deposited by the smoke from the many locomotives working in the vicinity. A test case is being brought against the C.P.R., to see if the city by-law cannot be enforced against the company for operating locomotives that give forth more smoke than the law allows. Commissioner Chisholm suggests the electrification of all railroads coming into the city as the only remedy.

Leather Prices High.—Owing to the depletion of stocks of tanners in Canada, caused by the lifting of the British embargo to Canada, while the American embargo continued, prices have advanced materially. Tanners are exercising extreme caution, as they feel that

the high prices may come down materially during the next few months, and are, therefore, unwilling to speculate on the future values. They are, therefore, keeping operations down, and this combined with the scarcity of raw materials, tends to keep the prices firm at their present levels.

Disastrous Boiler Explosion.—A disastrous explosion of a water tube boiler occurred at Newmarket, Ont., recently. The rear head of the steam drum blew out, demolishing the building immediately in its path, and blowing the occupants of the floor out into the street, injuring about thirteen, five of whom have since died. The immediate cause of the explosion was the deterioration of the metal below the water line of the drum, but the precise nature of the causes leading to this deterioration remains to be determined at the investigation which will be made

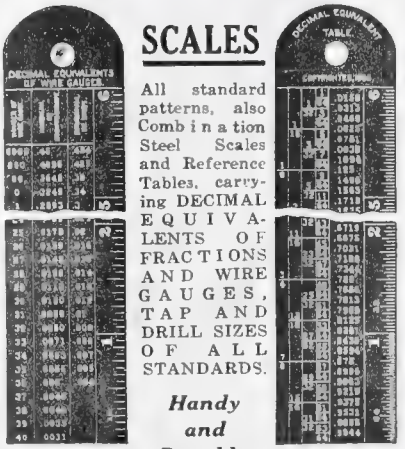
Furnace Installation.—The Electric Furnace Construction Co., Finance Building, Philadelphia, reports the following orders received for "Greaves-Etchells" electric furnaces; Lancia Co., Turin; Bresciana Co., Brusche. They have also successfully started up new furnaces at the Daimler Motor Co., Coventry; at the Tyne Electric Steel Foundries, Ltd., and also a furnace for Kayser-Ellison & Co., Ltd., Sheffield, designed for up to 15 tons cold metal or 20 tons hot metal process.

Oshawa.—Only eight votes were cast against the by-law to grant the Ontario Steel Products Co., of Gananoque, a fixed assessment of $20,000 for 10 years, on the factory buildings they propose to erect on the Rider property and premises, which they have purchased on the Ritson Road, north of the C.N.R., while 604 property owners voted for it, or nearly 99 per cent. The result of the voting was obtained with practically no organization and little effort.

Explosion an Accident.—The case of the explosion that occurred at the Davie Shipbuilding Co. plant, Lauzon, Levis, Que., that resulted in the death of one of the employees named Robert Henley, and serious injury of another named Xavier Levesque, was cleared up and found to be an accident. It appears that among the scrap recently purchased by the Davie Shipbuilding Co. included some piping that had been purchased from one of the Dominion munition plants. The pipe that caused the accident was placed on a bench to heat the T that could not be loosened, and naturally the workmen or no officer in connection with the works had the least idea that there was cordite or guncotton in the pipe. The pipe did not, however, burst with the force of the explosion. It appears from the investigation that fireman Henley was in the act of passing the mouth of the pipe lying on the bench, when the heated pipe went off, and he caught the full force of the contents, which stripped him of his clothing, and knocked him heavily against the wall, which resulted in his death.

CASTINGS
Medium Weight Grey Iron, Brass, Etc.
JOBBING
GREENLEAFS, LIMITED
Belleville, Ontario

WOODLAND
Fire Bricks
And Other Grades
CUPOLA BLOCKS
FIRE CLAY
Prompt Shipment
From our Stock at
MONTREAL
We Solicit Your Inquiries
HARBISON-WALKER REFRACTORIES CO.
OF CANADA, LIMITED
Office and Warehouse:
301 ATWATER AVENUE
MONTREAL, QUE., CANADA

LUFKIN

SCALES
All standard patterns, also Combination Steel Scales and Reference Tables, carrying DECIMAL EQUIVALENTS OF FRACTIONS AND WIRE GAUGES, TAP AND DRILL SIZES OF ALL STANDARDS.
Handy and Durable
THE LUFKIN RULE CO. OF CANADA, LTD.
WINDSOR, ONT.
3

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R. SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE — WORKS, MUSKEGON HEIGHTS, U.S.A.

PATENT ATTORNEYS

RESEARCH BUREAU
REPORTS BY EXPERTS ON SCIENTIFIC, TECHNICAL AND INDUSTRIAL DEVELOPMENT.
SPECIAL RESEARCHES ARRANGED.
PATENTS, TRADE MARKS, ETC.
HANBURY A. BUDDEN, 112 DRUMMOND BLDG., MONTREAL
CABLE ADDRESS "BREVET"

PATENTS
Fetherstonhaugh & Co.,
The old established firm. Patents everywhere. Head office, Royal Bank Bldg., Toronto. Ottawa office, 5 Elgin St. Offices throughout Canada.
Booklet Free.

PATENT YOUR INVENTIONS
Send direct to Ottawa for free patentability report and booklet "Patent Protection." Clients' patents advertised in the "Patent Review."
Harold C. Shipman & Co. PATENT ATTORNEYS
CENTRAL CHAMBERS, OTTAWA, CANADA.

PATENTS PROMPTLY SECURED
In all countries. Ask for our Investor's Adviser, which will be sent free.
MARION & MARION 364 University St.
Merchants Bank Building, corner St. Catherine St., MONTREAL, Phone Up. 6474
and Washington, D.C., U.S.A.

'Barnes-Made' Springs

are unusual in service and wear.
They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.
A trial will convince you that "Barnes-Made" Springs are the best buy.
Established 1858
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.
BRANCH OFFICES: 50 East 42nd St., New York City; 618 Book Bldg., Detroit, Mich
Manufrs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

PLEWES Limited
WINNIPEG
For All
Machinists' Supplies

CLASSIFIED ADVERTISING SECTION

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

POSITIONS WANTED

EXECUTIVE POSITION WANTED—DO YOU require a man to take charge of either your Purchasing or Accounting Department? One who has initiative, and is not afraid of hard work or responsibility. Have had seven years' experience on foundry and general machine shop work, four of which was on munitions. If interested apply to Box 604, Canadian Machinery.

WANTED—POSITION AS FOUNDRY FOREman, capable of fulfilling all duties required. Machinery or jobbing shop preferred. Excellent references. Reply Box 603, Canadian Machinery, Toronto.

FOR SALE

Used locomotive crane.
Engine—Double-cylinder, 9" x 12" stroke.
Boiler—Vertical, new tubes, hood and smoke-stack, good for 100 lbs. working pressure.
Bucket—¾-yard, boom 58 ft. 6 in. long, wheel base 14 ft., gauge 14 ft.; hoisting and slewing gears in good condition.
All motions operated from one platform.
Further particulars on application to:
CANADIAN ALOXITE CO., LTD., P.O. Box 536, Niagara Falls, N.Y.
(c25m)

WANTED

1—"Used" Plate Punch and Shear 36" gap, capacity ⅞" hole in ⅞" plate
—also—
1—"Used" Air Compressor, steam actuated — compound steam—simple air —12" x 12" cylinder.

Both machines must be modern in design and in good operating condition. Offers with full details, price and shipping point, will be considered.

I. MATHESON & CO., LTD.
Builders of Machinery
New Glasgow, - Nova Scotia

HELP WANTED

PRODUCTION MAN WANTED BY LARGE concern manufacturing heavy hardware lines. Must possess wide mechanical knowledge and have had considerable shop experience. Graduate preferred. Apply giving full particulars as to age, experience, salary expected, etc., to Canada Foundries & Forgings, Ltd., James Smart Plant. Brockville, Ont. (c25m)

WANTED—TOOL ROOM FOREMAN ON AUtomobile Drop Forge Dies and general machine work. Must be skilled in close work. State age, salary expected, where last employed and in what capacity. Address Box 609, Canadian Machinery. (c26m)

MECHANICAL DRAUGHTSMAN REQUIRED with experience in gasoline engine design. Knowledge of farm machinery desirable. Apply in the first instance with full particulars regarding experience, salary required, etc., with copy of references, to Box 611, Canadian Machinery. (c1m)

Mining Machinery for Sale

Alley & McLellan Air Compressor 600 ft. at 100 lbs. pressure, 125 H.P. Motor, heavy duty 600 R.P.M. 3 phase 60 cycle 550 volts.
Ingersoll-Rand 800 ft. Air Compressor.
1 Tube Mill Fraser & Chalmers 5 x 22.
1 Power & Mining 5 x 22.
Also large assortment of Pumps, Tanks, Classifiers, Boilers and Mining Equipment for sale.

Zenith Coal & Steel Products
Limited
402 McGill Building Montreal
1410 Royal Bank Bldg., Toronto, Ont.

Lightning Unit

FOR SALE—One used lighting unit, consisting of one 25 K.W., 125 volt, 200 ampere direct current generator to operate at speed of 320 to 350 r.p.m. Generator made by Westinghouse Company. This machine is directly connected with a Goldie & McCulloch 9x10 Ideal engine. This machine can be examined and all particulars obtained at the plant of

G.W. McFarlane Engineering Co.
PARIS, ONT. c1m

FOR SALE

FOR SALE—CHEAP.
ONE NO. 4 R "REBUILT" COWAN TRANSveyor in "first-class condition," carrying capacity 3500 lbs.; carry wooden platform up to 40 x 66". AAdress R. B. Smiley, Canadian Mgr., 120 Glenholm Ave., Toronto, Ont. (c26m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (etfm)

Business Opportunities

I HAVE A PATENT ON AN ELEVATING OR lifting truck and would like very much to make arrangements to organize a company in Canada to make and sell them, or to arrange with some firm to make and sell them on a royalty basis, or would consider an out and out sale. Address Box 608, Canadian Machinery. (c25m)

A CANADIAN MANUFACTURER OF MACHinery for the use of Contractors, Miners, etc., is open to undertake the manufacture of any other machinery or device for the use of either contractors or miners, and invites correspondence with holders of Canadian patents, or with U. S. concerns desiring a Canadian manufacturing agency. Liberal inducements also offered for successful suggestions regarding machinery or other articles that can be manufactured and sold in connection with the above-mentioned lines. Address Box 610, Canadian Machinery. (c2m)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. **Patterns in wood and metal for all kinds of machinery.** (efm)

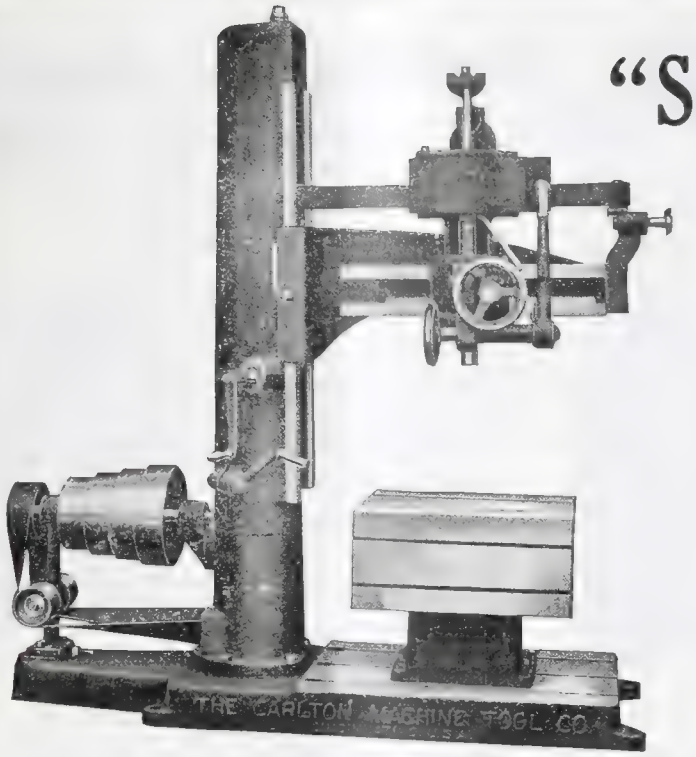
BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (etfm)

LOCOMOTIVE

For sale, one 35-ton shunting locomotive, complete with trailer, tender, air pump, etc.

In good operating condition, can be seen and all particulars obtained at the plant of

THE G. W. McFARLANE ENGINEERING CO.
PARIS, ONT. C26M



"Speedy-Sensitive" RADIAL DRILL

This machine has driven a ½-inch, high-speed drill, running 900 revolutions per minute, through a 2-inch cast iron plate, at the rate of 25 inches per minute, with a feed of .028-inch per revolution of the spindle and drills of other sizes in proportion.

For quick, accurate, productive work.

GARLOCK-WALKER MACHINERY COMPANY, Limited
MONTREAL 32 Front Street West, TORONTO WINNIPEG
"EVERYTHING IN METAL AND WOOD WORKING MACHINERY"

Mill and Mining Machinery

1 Babcock & Wilcox Water Tube Boiler, 100 h. p., 36 in. x 20 ft. 0 in., 4 in Tubes with complete fittings. Working pressure 150 lbs.

1 Blaisdale Air Compressor, 14 x 14 and 22 x 16. 150 r. p. m. Duplex Steam, Compound Air. Steam and air pressure 100 lbs. Displacement 1126 cu. ft. per minute.

1 C. C. Canadian Rand Compressor, 9 x 12. 14 x 12.

1 Matheson Feed Water Heater, 3 ft. x 18 in.

1 Stack, 60 ft. x 30 in. x 3-16 in. Steel.

1 Lidgerwood Single Drum Friction Hoist, 10 x 12.-54 in. and extra piston. Corrugated Drums built to carry 1100 ft. 1 in. rope. Load 4,500 lbs. Maximum speed 800 ft. per minute at 100 lbs. pressure. Including Dial Indicator.

NEW GLASGOW MACHINE CO.
NEW GLASGOW, NOVA SCOTIA

For Sale

New and Slightly Used Machinery and Tools

1", 1½", 1⅝", 1¾", Turret Screw Machines.
No. 1, and No. 2 B.G. Automatic Tapping Machines.
⅜" 4-Spindle Acme Automatic Screw Machines.
Floor and Bench Drill—Presses.
Small Floor and Bench Punch Presses.
Burke Millers.
High Speed and Carbon Twist Drills.

Particulars on application to

ST. CATHARINES MACHINERY CO., LIMITED
ST. CATHARINES, - ONTARIO

WANTED

Entire Plants or Separate Tools

What have you to offer?

State condition, make and price. We pay cash for any type of machines, motors or belting.

Give full details in first letter.

Hollander Machinery Co., Inc.
3 Howard Street N.Y. City

YOU'LL FIND WHAT YOU WANT

In the Classified Advertising Section of Canadian Machinery. Watch it each week for all kinds of new and used machinery.

YOU MAY WANT WHAT YOU FIND.

MACGOVERN & COMPANY INCORPORATED POWER MACHINERY

ALTERNATING CURRENT UNITS

(ENGINE DRIVEN)

2 and 3 Phase—25 Cycles.

Generator. K.W.	Volts.	R.P.M.	Engine. Cylinder Dimensions.
250	220	214	15 x 22 x 17"
260	220	214	15 x 17"
450	550	125	17 x 34 x 30"
1000	240	107	24 x 48 x 42"

2 and 3 Phase—60 Cycles.

Generator. K.W.	Volts.	R.P.M.	Engine. Cylinder Dimensions.
25	440	1200	8 x 8"
50	2200	300	11 x 19 x 11"
50	2300	300	11 x 12"
100½	240	277	14 x 14"
125	220	225	14½ x 18"
125	240	200	12 x 21"
150	220	225	10 x 20 x 18"
150	2300	225	14 x 22 x 16"
200	2300	200	
300	480	150	14 x 28 x 30"
300	2300	150	18 x 30 x 22"
325	2300	120	24 x 36"
325	2300	150	18 x 36 x 24"
400	600	150	24"
450	2300	100	22 x 42 x 48"
450	550		24 x 36 x 36"
500	480	120	20 x 40 x 36"
600	2300	150	20 x 38 x 24"

MACGOVERN & COMPANY, INC.

285 BEAVER HALL HILL, MONTREAL

Offices: New York, Pittsburg, St. Louis
Plants: Brooklyn, N.Y., Lincoln, N.J., and Linden, N.J.

A Continent-Wide Service.

Used Material Offered Subject to Prior Sale

F.O.B. GUELPH

2 - Libby Lathes 20" Swing x 9' Bed complete with Turret and Countershaft, each .....$ 750.00
1—McGregor Turret Lathe 24" Swing x 10 ft. Bed with Countershaft, each 500.00
1—Bury Air Compressor 12 x 14"—Class M 330 Cubic Ft. per minute—Belt Driven..... 1,000.00
1 6 x 8 Perrin Accumulator with Unloader ... 300.00
3—Perrin Triplex Geared Pumps 1¼ x 5..... 200.00
1—West Tire Setter Geared Pump 150.00
1—Perrin Power Press used for 6" Shell Nosing 250.00
1—No. 1 Lelland & Falconer Wet Tool Grinder 40.00
70—Wood Split Pulleys from 6" to 40" dia...50 and 25% off present Canadian Price List.
2—24 x 4 Press Steel Pulleys, each 3.50
56—7, 8, 10, 12 and 18" Drop Hangers C.I. 2 7/16" ..... } Special Prices on Application
Sundry lot 2 7/16" Shafting..... }
1—No. 4 Acme Blower 40.00
1—Size 3-S Little David Chipping Hammer—made by Ingersoll-Rand, 3" Stroke 13¼ Overall—13 lb. weight, 17 cubic ft. per minute, new 28.65
1—Type "B" Size No. 7 Riveter made by Keller Pneumatic Tool Co., will rivet up to ⅞".. 30.00
Perring Accumulator with 28 tons of Iron on Platform 2,000 lbs. water pressure is raised.

Taylor-Forbes Company
Limited

MARTEN MACHINE COMPANY HAMILTON, ONT.

TOOLS

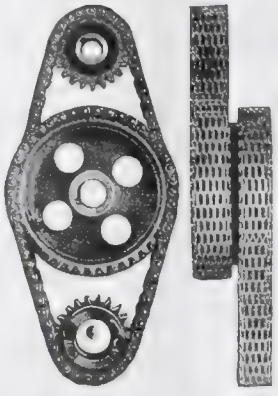
ACCURACY---RELIABILITY

OUR REGULAR PRODUCTS:
THREAD GAUGES
SNAP GAUGES
CYLINDRICAL GAUGES

WE ARE GENERAL AND SPECIAL TOOL MAKERS

Let us quote you on your requirements, and have your tools made as you want them made.

WOOD PATTERNS
METAL PATTERNS Hand and Machine



War Record Not Made Public

The "Whitney" Special Quality "Type M" Chains

made a great showing during the war years 1916-17 and 1918.

Our tests and demonstrations were made on prominent 8-cylinder motors in service on a large number of cars in the State of Connecticut.

During this long period not a single "Whitney" Chain or Sprocket had to be replaced and the condition of every Drive has been pronounced remarkable.

One Drive recently examined had given over 35,000 miles' service and both Chains and Sprokets were in such perfect condition that they appeared good for more than double that record (Sprockets having no adjustment).

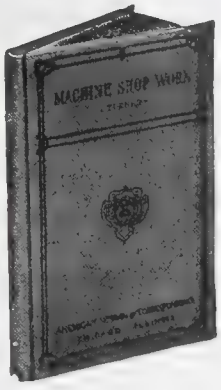
The links of this SPECIAL CHAIN have finished faces and reamed holes, and the smooth faces do not damage the Sprocket teeth.

Our war contracts were such that we did not announce this SPECIAL CHAIN until after the conflict was over.

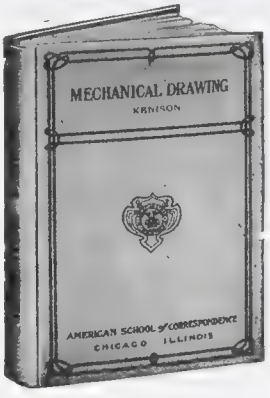
THE WHITNEY MFG. CO.,
Hartford, Connecticut

Mechanical Engineering Books

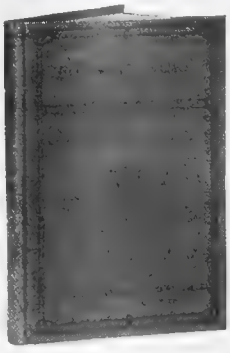
If you are desirous of improving yourself in your trade and so putting yourself in the position of making more money, these Mechanical Engineering Books will be found helpful.



MACHINE-SHOP WORK. By **Frederick W. Turner,** Instructor in Machine-Shop Work, Mechanics Arts High School, Boston. 208 pp., 241 illus. Cloth binding. The use of various hand tools is explained, followed by a comprehensive discussion of the lathe and lathe tools, with the methods of screw cutting, taper and eccentric turning, etc. The way to figure compound gears for screw cutting; drilling; boring; planers; shapers; slotters; milling machines and cutters; how to cut spirals, gears, cams, etc.; grinding; the operation of automatic machines. Price $1 75

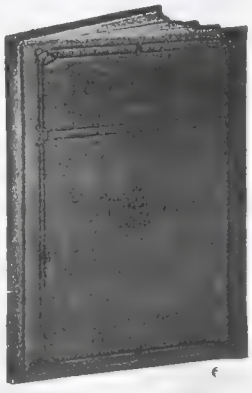


MECHANICAL DRAWING. By **Ervin Kenison, S.B.,** Assistant Professor of Mechanical Drawing, Massachusetts Institute of Technology. 176 pp., 120 illus. Cloth binding. Gives a course of practical instruction in the art of Mechanical Drawing, based on methods that have stood the test of years of experience. Includes orthographic, isometric and oblique projections, shade lines, intersections and developments, lettering, etc., with abundant exercises and plates. Price $1.00



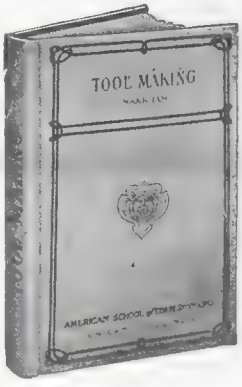
FOUNDRY WORK. Revised by **Burton L. Gray,** instructor in Foundry Practice, Worcester Polytechnic Institute. 224 pp., 191 illus. Cloth binding. A practical handbook on standard foundry practice, including hand and machine molding, cast iron, malleable iron, steel and brass casting, foundry management, etc. Includes use of various types of molding machines. Price, **$1.00**

PATTERN MAKING. By **James Ritchey,** Instructor in Wood Working, Armour Institute of Technology. 160 pp., 250 illus. Cloth binding. Shows the reader how to take the blueprint and from it make the pattern for any kind of casting under any condition. The allowances for shrinkage, draft, and finish are explained. Simple and built-up patterns of all kinds are clearly treated. Various special cases are taken up, such as pulleys, cranks, pipe connections, valves, etc. Price.....**$1.50**



MACHINE DESIGN. By **Charles L. Griffin, S.B.,** Assistant Engineer, the Solvay-Process Co., American Society of Mechanical Engineers. 208 pp., 82 designs. Cloth binding. Explains in detail how to make the entire design of all kinds of machinery, how to lay out gears, etc., with complete specimen designs of numerous machines. Price .. $1.50

TOOL MAKING. By **Edward R. Markham,** Consulting Mechanical Engineer, formerly Superintendent of the Waltham Watch Tool Co., American Society of Mechanical Engineers. Author of "The American Steel Worker." 224 pp., 325 illus. Cloth binding. Takes up the methods of treating tool steels—annealing, tempering, spring tempering, hardening, case-hardening, etc.; how to make drills and reamers of all kinds; the making of arbors and mandrels, taps, hobs, reamer and tap-holders, jigs, gauges, dies and die-holders of all kinds, counterbores, facing tools, milling cutters, hollow mills, and forming tools. Gives all necessary information for tool making in all its branches. Price $1.75



FORGING. By **John Lord Bacon,** Eng. and Supt. of Construction, with **R. P. Shields** & Son, San Diego, Cal., American Society Mechanical Engineers. Author of "Forge Practice." 128 pp., 180 illus. Cloth binding. A working handbook of practical instruction in hammering, working, forming, and tempering of wrought iron, machine steel, and tool steel, including the important modern development of electric welding. Price $1.00

Sent postpaid on receipt of price. We can also furnish you with other standard works on Engineering in all its branches, including books for Civil Engineers, Contractors, Electricians, Foundrymen, Steam Engineers, Mechanical Engineers, Municipal Engineers, Railroad Engineers, Sanitary Engineers, Gas Engineers, Hydraulic Engineers, Technical Men.

Technical Book Department

MacLean Publishing Company **143 University Ave., Toronto**

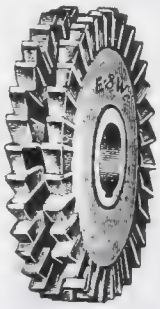
SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

Elliott & Whitehall Machine & Tool Co.
GALT, ONTARIO, CANADA

MILLING CUTTERS AND SMALL TOOLS



We manufacture the following tools, etc.

Standard and Special Milling Cutters of all descriptions, Gear Cutters, Hand Reamers, Shell Reamers, Chucking Reamers and Taper Pin Reamers, Lathe Mandrels and Arbors, Metal Stamping Dies, Gauges, Jigs and Fixtures, Etc.

All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

ASK FOR OUR NEW CATALOGUE No. 10.

EMERGENCY REPAIRS Electric, Thermit and Oxy-Acetylene Welding

Telephone us and we'll be on the job by NEXT train with our Portable Oxy-Acetylene Outfit and Skilled Mechanics. We're always ready.

THE
ST. LAWREENC WELDING CO., Ltd.
A. M. BARRY, Managing Director
138-140 Inspector Street Montreal, Que.
Long Distance Phone Maine 5779 Maritime Branch :
Nights : Wsetmount 3483 HALIFAX, N.S.

TOOLS & STAMPINGS

We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.

HOMER & WILSON
Stamping and Tool Works
1-5 Lancaster St., Hamilton

WELDING APPARATUS AND . . . SUPPLIES

The REGO 100% Efficient Welding Torch
Saves Oxygen Eliminates Flash-Back Better Welding
Write to us for anything and everything you need.

WELDING & SUPPLIES COMPANY
C. ROYER, Manager 1142 Ontario Street East, MONTREAL

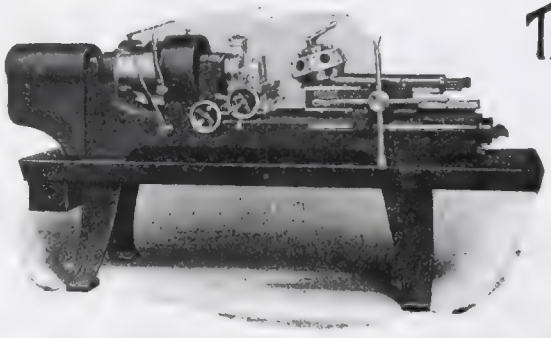
TOOLS, DIES and GAUGES

Manufacturers of UNIVERSAL CYLINDER RE-BORING TOOLS.

Windsor Machine & Tool Works
Windsor, Ont.

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



THE TILTED TURRET Lathes and Screw Machines
ARE ACCURATE AND PRODUCTIVE
Made In Twelve Different Sizes
ASK THE USER
Send for Catalogue "C"

WOOD TURRET MACHINE CO.
BRAZIL INDIANA U.S.A.

STEEL CASTINGS

1 to 5,000 pounds

Highest Quality

PROMPT AND RELIABLE SERVICE

SWEDISH CRUCIBLE STEEL CO.
OF CANADA, Ltd., Windsor, Ont.

DIAMOND TOOLS

FOR TRUEING GRINDING WHEELS

The GENERAL SUPPLY COMPANY of CANADA, Limited
OTTAWA TORONTO MONTREAL WINNIPEG VANCOUVER
356 Spark St. 38 Toronto St. 408 McGill Bldg. 85 Water St. 906 Vancouver Block
Sole Canadian Agents for
THE JOYCE-KOEBEL COMPANY, INC.
NEW YORK Formerly Geo. A. Joyce Co., Ltd. LONDON

FITCHBURG

Plain Cylindrical Grinders

Built by

Fitchburg Grinding Machine Co.
FITCHBURG, MASS., U.S.A.

BATH Universal Manufacturing Grinders

built by

Universal Grinding Machine Company

Fitchburg, Mass. *U. S. A.*

Presswork

We take contract work—and turn it out quickly and accurately. We have facilities for:

Drawing
Piercing
Forming
Blanking

in all kinds of sheet metal. If you have any work of this kind let us quote you prices.

Henry Hope & Sons
of Canada, Limited
Peterborough

"VICTORIA"

For Special Tools and Machines Of All Kinds

PATTERNS - CASTINGS - FORGINGS

Buy Your Machinery in Canada

Submit Us Your Problems. ∴ Or Blue Prints.

We are pleased to quote on contract work

RELIABLE SERVICE ∴ PROMPT DELIVERY

VICTORIA FOUNDRY CO., LIMITED

OTTAWA ∴ CANADA

PUNCH PRESS WORK

What Can You Save?

By Using Parts Made in the Punch Press

Look over your standard parts, Mr. Manufacturer, and see what parts can be made (or could be made by slight change in design) by this process.

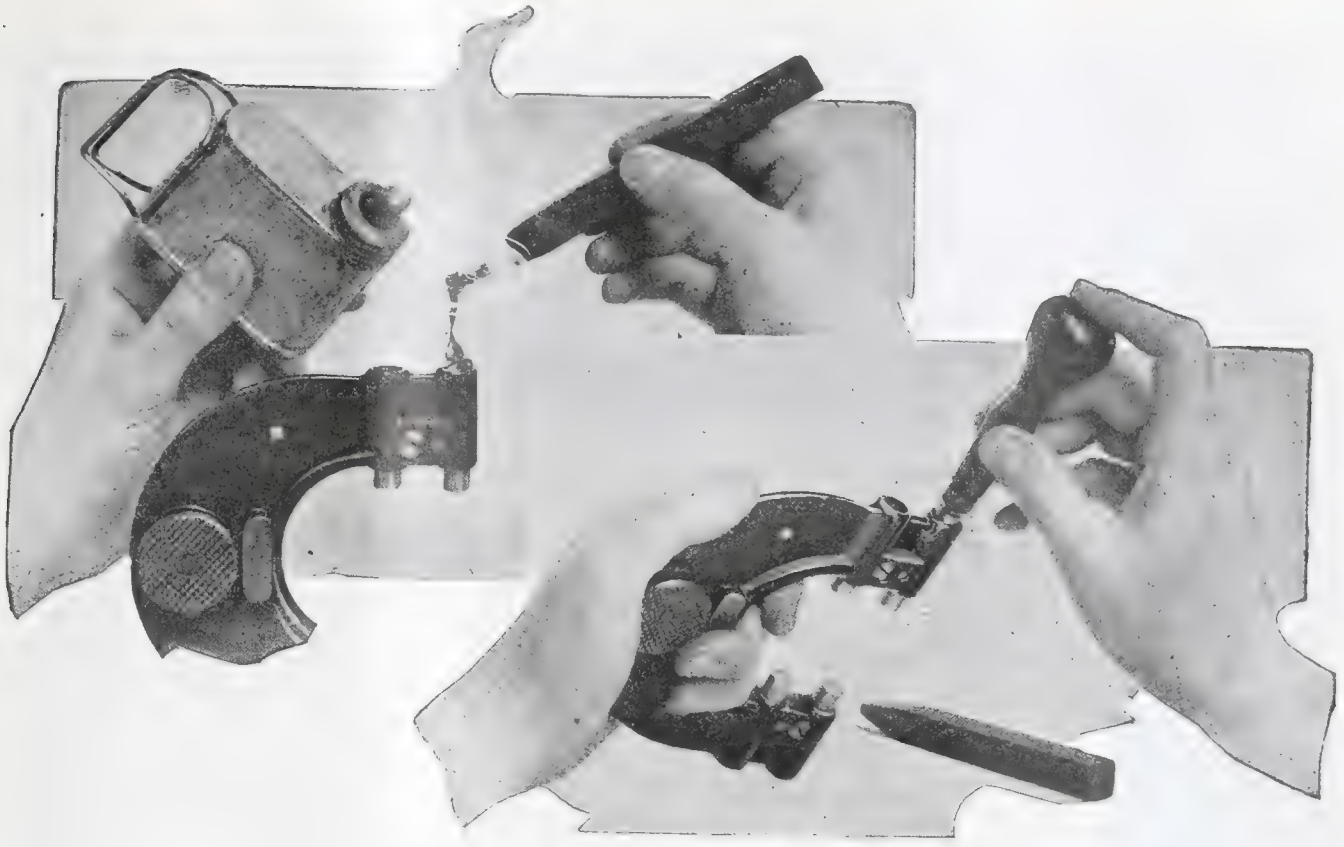
You will be surprised at the saving you can effect.

We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

A Battery of presses is also available at our plant to manufacture parts for you with the understanding that you pay only for good parts made. Our facilities ensure prompt deliveries at right prices.

W. H. BANFIELD & SONS LTD.

370-386 PAPE AVE., TORONTO.

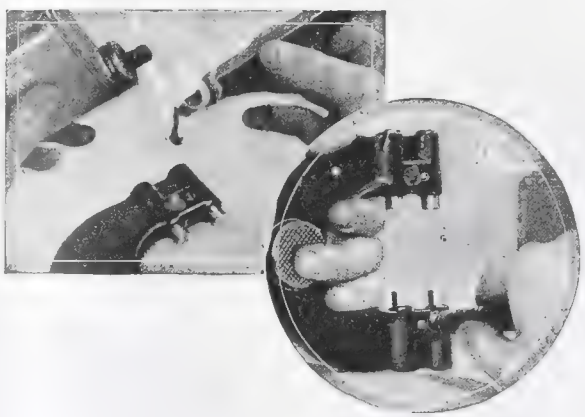


They Can Be SEALED!

"ADJUSTABLE in the tool-room—SOLID in the hands of operators and inspectors." That's Johansson Limit Snap Gages.

For when a Johansson Snap has been set, it can also be SEALED.

Just melt sealing wax into the heads of the screws and stamp the sealer's mark—it's just as much a solid gage then as though made of a single piece. Cannot be changed or tampered with in any way without breaking the seal. And then you know who's who.



Johansson Snaps are made to be used SEALED.

And with thousands of them in use every day on all kinds of big production and inspection, we never hear of work being spoiled because the gage changed size. The fact is, they don't change size. They can't; they are adjusted, set and sealed by responsible hands and when sent out in the shop they retain their size.

When worn, they are quickly *reset* and *resealed* and are put back on the job with a minimum of time lost.

Twenty-one sizes give all dimensions up to 12 inches.

Revised price list (No. 3) now ready.

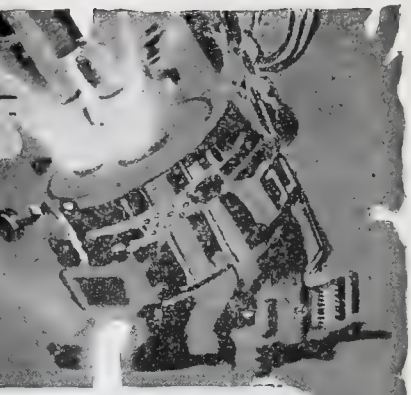
Johansson

C. E. JOHANSSON, Inc., 72 Queen St. West, Toronto

Successor to Swedish Gage Co.

American Address: 245 West 55th Street, New York City

Nichrome Castings for Heat Treatment



Cast Nichrome Advantages at 1800° F.

Non-cracking

Non-growing

Non-scaling

Non-warping

High tensile strength

Light weight

High heat conductivity

Life of thousands of hours guaranteed.

Nichrome Castings reduce the unit cost of heat treating.

CANADIAN DRIVER-HARRIS CO., Ltd.

WALKERVILLE, ONT. CANADA

CHICAGO

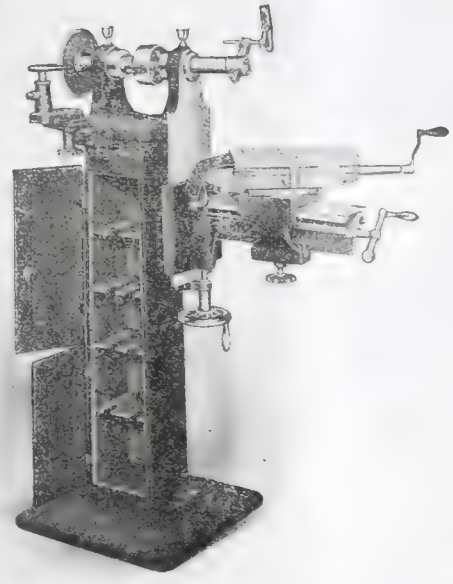
MANCHESTER ENGLAND

HARRISON, N. J.

Manufactured under Henderson Patents.

14

OBTAIN THE BEST RESULTS



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL
CUTTER AND SURFACE GRINDERS

Simple Light Running Accurate

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets ***(Visitors Welcome)*** **50 Years New York City**

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor

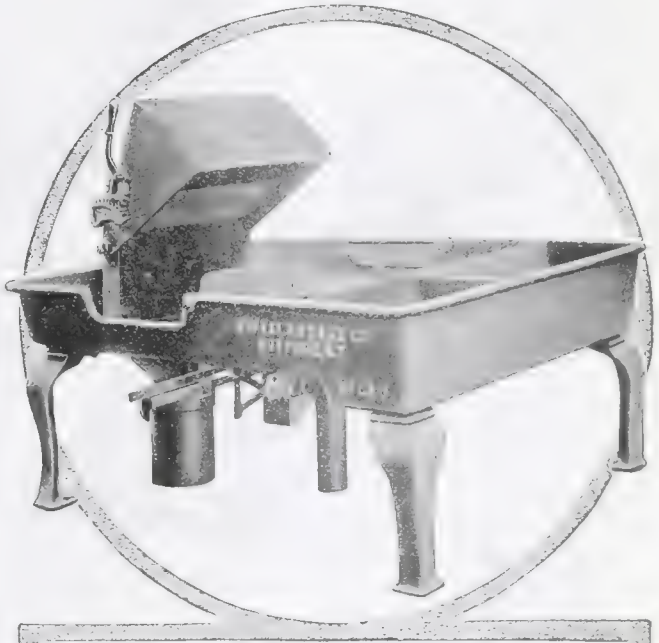
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.



HEAVY DUTY FORGES

Canadian Forges are designed for the particular work they are required to do.

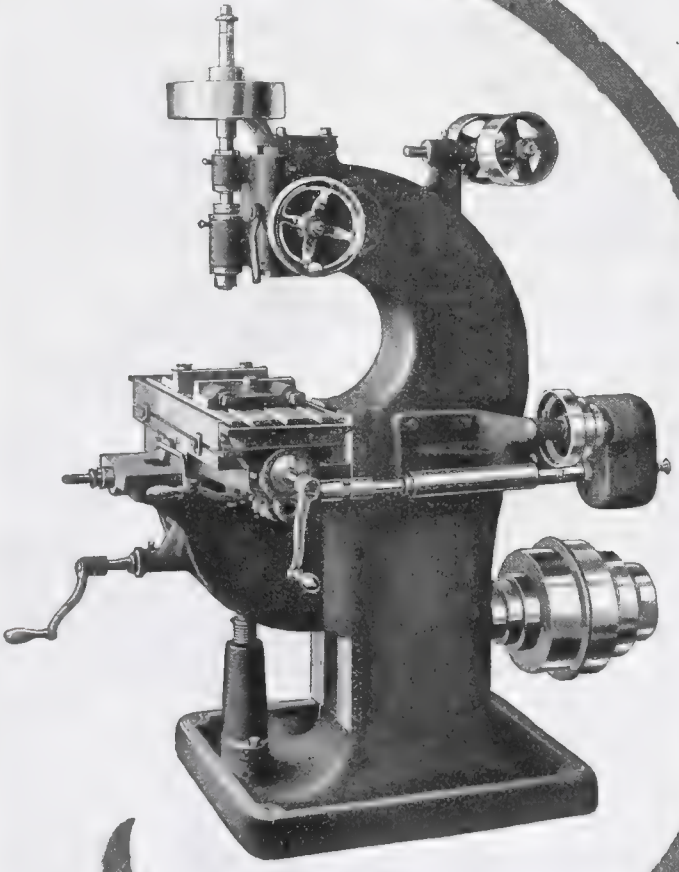
Our Catalogs 100 and 108-16 describe our full line—Write for a copy.

CANADIAN BLOWER & FORGE CO., LTD.
Kitchener, Ontario

BRISTOL

Bristol Vertical Milling Machine

A Tool of Large Capacity



Ball Bearings are used at the most important points making it a free running tool, which, combined with its being a belt-driven machine, makes it capable of turning out work on which an extra smooth finish is desired.

The longtitudal table feed is controlled by the gear change box which gives six different feeds for each change of spindle speed. A stop to gauge with micrometer adjustment is used on the head to regulate the depth of cuts.

Learn all about its production capacity.

Write for bulletin giving fullest particulars.

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
BRISTOL, CONN.

NATCO

IDLE SPINDLES ARE IN NEUTRAL

Gun Carriage Hubs had to be drilled with utmost speed — that's why a NATCO MULTI-DRILLER was on the job.

The illustration is with the courtesy of the Willys-Overland Co. Eight 25/32 in. holes are being drilled 9 16 in. deep, and although the material is cast steel, a production of 25 hubs an hour was obtained.

The machine is equipped with the NATCO patented feature—Independent Change of Speed for each Spindle. This permits the drilling of different sized holes in one operation, with each tool driven at approximately its correct cutting speed. Furthermore, idle spindles are in neutral, saving wear and power.

NATCOS are the only multiple drills that enjoy this special productive feature.

NATCOS are arranged with from 2 to 72 spindles and with drilling area of from 12 in. diameter circle to 18 x 48 in. rectangular.

The National Automatic Tool Co., Richmond, Ind.

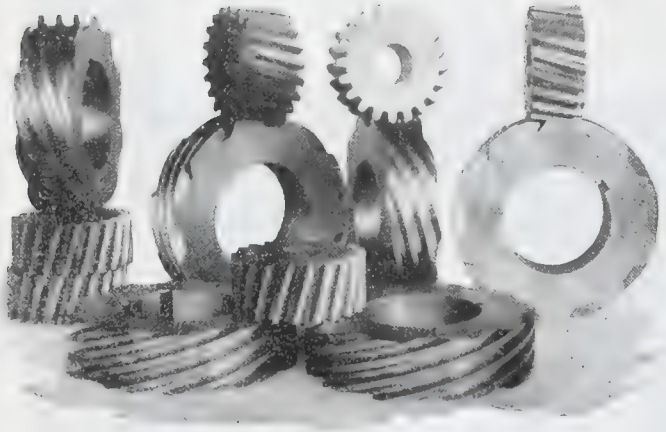
Let us Furnish Production Estimate on Your Work

Foreign Agents:

Burton, Griffiths & Co., British Isles.
A. R. Williams Machinery Co., Limited, Toronto, Canada.
E. Isbecque & Co., Belgium.
Allied Machinery Co. of America, Italy, Spain, Portugal and Switzerland.
Aux Forges De Vulcain, France.

Helical Gears

Accurately Hobbed in Quantities



Steel Helical Gears

"Generated" Teeth
Pack Hardened
Ground Bores
A Quality Job

Write for Quotations

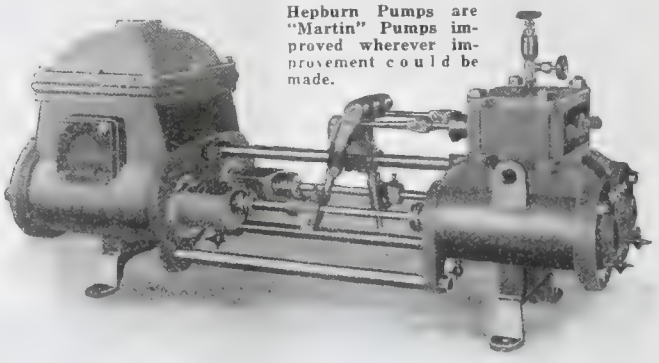
HAMILTON GEAR CO. LTD

Van Horne Street - TORONTO

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

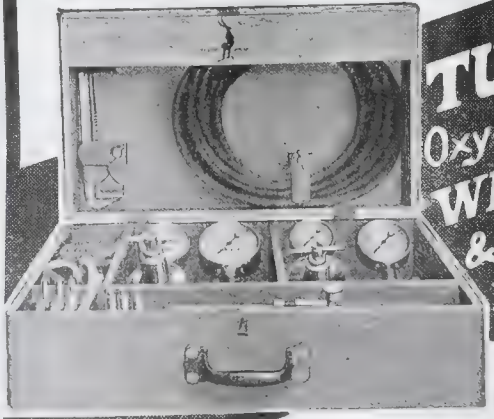
Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario

For Repairing Broken Machinery or Tools of Medium Size



TURNER Oxy-Acetylene WELDING & CUTTING Equipment

These outfits will soon pay their cost in machine parts or tools reclaimed. The sectional extensions of the torch enable the operator to adjust it to any desired length or angle. The location of valves is such that the flame is controlled by one hand, leaving the other hand free for the work at all times.

For full particulars write

The Turner Brass Works

SYCAMORE, ILLINOIS, U.S.A.

Let them know it's there

In complimenting us upon the results secured from their advertisement in the classified section, one advertiser said:

> "Of course we would not have sold it without letting people know it was here, that is obvious, and thanks are due you for letting the people know it was for sale."

If you have any old or used equipment for sale, let people know it's there. Your message in Canadian Machinery will be placed before the probable buyers of such equipment.

Canadian Machinery

Classified Advertising Section

143 University Ave., TORONTO

The Financial Post

This is a business man's paper. It is of interest to every man who has money invested either in his own business or in bonds and securities of various kinds. It is published weekly, and the news is given in very readable form.

Wholesale and retail merchants find it valuable because they are interested in market tendencies and market factors, not only as applied to their business, but also as applying to business in general. They need to know conditions local and remote. They need information to enable them to buy right and sell safely.

And the knowledge they need they can have for the insignificant sum of $3 annually.

THE FINANCIAL POST OF CANADA,
143-153 University Ave., Toronto.

Please enter me as a regular subscriber, commencing at once. If I am satisfied with the paper, I will remit $3 to pay for my subscription on receipt of bill.

.....

.....

C. M.

Oxy-Acetylene Welding and Cutting

Sometimes the Only Way— Generally the Best Way Always a Possible Way—

Wherever two pieces of metal are to be joined, the Prest-O-Lite Process of Oxy-Acetylene Welding provides a simple, low-cost method. It opens the way to metal manufacturing, construction and repair operations which cannot be performed by any other process.

In practically every metal manufacturing industry oxy-acetylene welding is providing better, neater-appearing and more lasting joints than have been hitherto obtainable by riveting, threading or other methods, and at the same time is lowering production costs. Operations on metal parts, large and small, are handled easily, quickly and economically by this process. Welded joints can be built up to give added strength if desired. The metal is left in satisfactory condition for subsequent machining. For repair work it more than pays its way—preventing costly delays and replacements—handling the jobs "right on the spot" with efficiency and dispatch.

Prest-O-Lite PROCESS

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones. Provides dry, purified gas, insuring better welds, quicker work and lower operating cost. Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment. Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

This Welding outfit is portable, and handy for use inside or outside the shop. The Prest-O-Lite system of exchanging your empty cylinders for full ones insures perpetual service.

Write for valuable illustrated literature and data on work others are doing by the Prest-O-Lite Welding Process. It may point out ways to solve your problems. Address Dept. C 106

Prest-O-Lite Company of Canada, Limited

PREST-O-LITE BUILDING
Corner Elm Street and Centre Avenue
TORONTO

Plants: Toronto, Ont., Merritton, Ont. St. Boniface, Man., Shawinigan Falls, P.Q.

World's Largest Makers of Dissolved Acetylene

One Customer says:

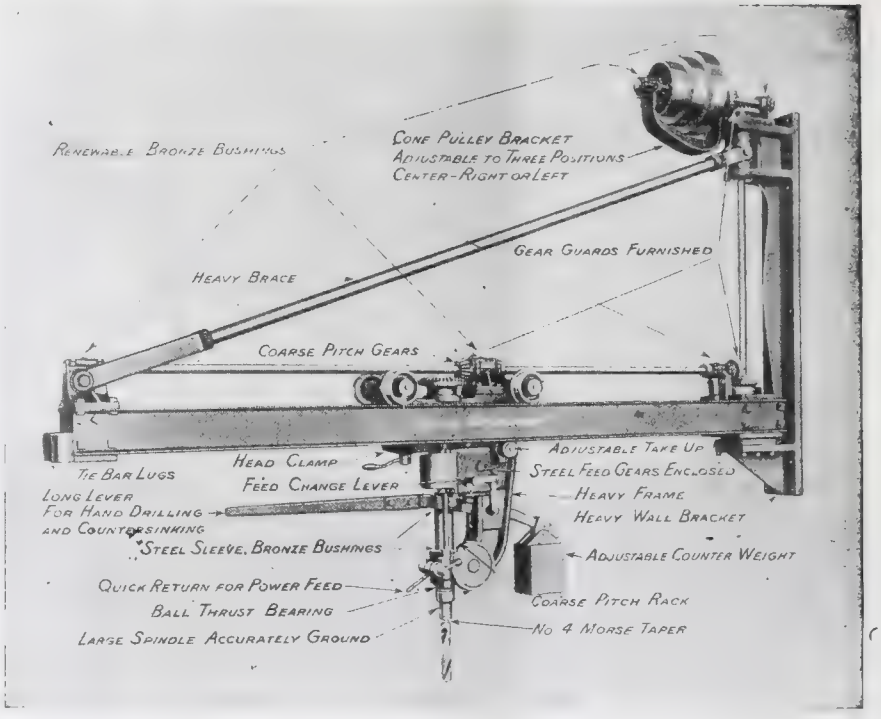
"These machines were put in operation immediately upon arrival, have been producing ten hours per day every day since, and we have never experienced a bit of trouble with same." We know you will appreciate what this means in any shop, and believe this is the sort of machine you are looking for. We consider the machine the finest in its line on the market to-day, and believe an installation would save money for you in the cost of your production.

Our illustrated bulletin will interest you, giving detailed information.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**

H. COLLIER SMITH

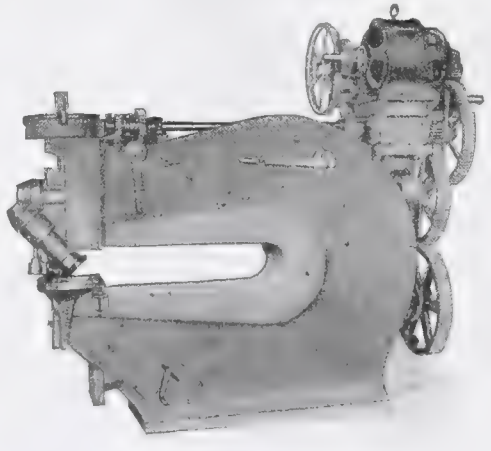
"QUICKWORK"

Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

Write for Catalogue

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

Hydraulic Screw and Filter Presses

Made in Canada

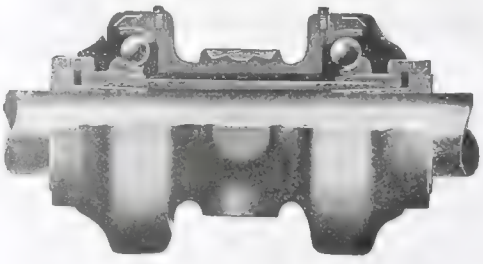
Hydraulic Truck Tire Press

WILLIAM PERRIN LIMITED

TORONTO

MADE IN CANADA

Friction Practically Eliminated



Lubrication required only once or twice a year

There's a Good Reason

When such firms as Pierce Arrow Motor Co., Ford Motor Co., Bethlehem Steel Co., International Harvester Co., Fairbanks-Morse Co., Goodyear Tire & Rubber Co., and 3,000 other plants installed **Chapman Ball Bearings** for their transmission machinery they did so for one good reason—because **Chapman Ball Bearings** eliminate friction and reduce power loss to a minimum.

The power saved by **Chapman Ball Bearings** will in two years' time pay for their installation.

Chapman Ball Bearings will fit into the hangers you have now—there is no necessity of going to the time and expense of new equipment.

Write for Catalog 3-B, which explains in detail the savings Chapman Type Ball Bearings will effect for you.

The Chapman Double Ball Bearing Co., Limited

339 Sorauren Ave., Toronto, Canada - 408 Shaughnessy Bldg., Montreal, Que.

The Transmission Ball Bearing Co., Inc.

1050 Military Road, Buffalo, N.Y.

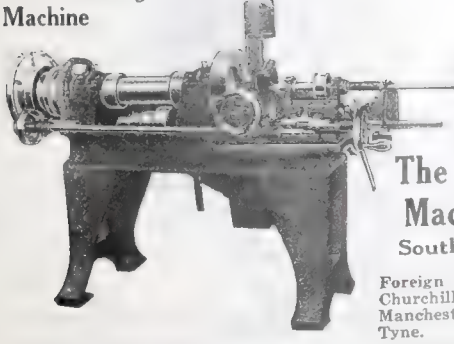
New York Cleveland Chicago Philadelphia Cambridge, Mass.

One Cuts Up
Another Cuts Down
and
They Both Cut
At Once

Here's Real Economy

This patented Hurlbut, Rogers Cutting-Off and Centering Machine embodies two cutting-off tools—one cutting up and the other cutting down; each holding the work against the other. What is the result?—**the production is doubled and the cost is cut in half.** Further, the centering operation goes on at the same time. Doesn't this appeal to you as real economy in production? When you are assured of such good-paying results why hesitate to adopt this machine? Soon pays for itself.

Hurlbut, Rogers Cutting-off and Centering Machine

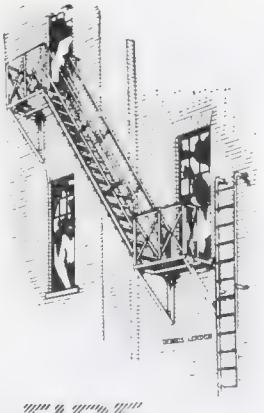


Let us hear from you and we will give you the full story of its ability.

The Hurlbut, Rogers Machine Company

South Sudbury Mass.

Foreign Agents — England: Chas. Churchill & Co., Limited, London, Manchester, Glasgow, Newcastle-on-Tyne.



Danger to Life

FIRE ESCAPES

is not a thing that many business heads would willingly perpetuate, yet continued neglect to provide adequate fire escape facilities is simply inviting disasters such as horrify the country from time to time.

When a man knows his duty, he should not wait to be **forced** to do it, should he?

If your facilities are ample, you do not need our services. If not, we are ready to help in every possible way. Write for illustrated folders, estimates and diagrams on your requirements.

THE DENNIS WIRE AND IRON WORKS CO. LIMITED
LONDON
CANADA

Halifax Montreal Ottawa Toronto Hamilton Winnipeg Calgary Vancouver

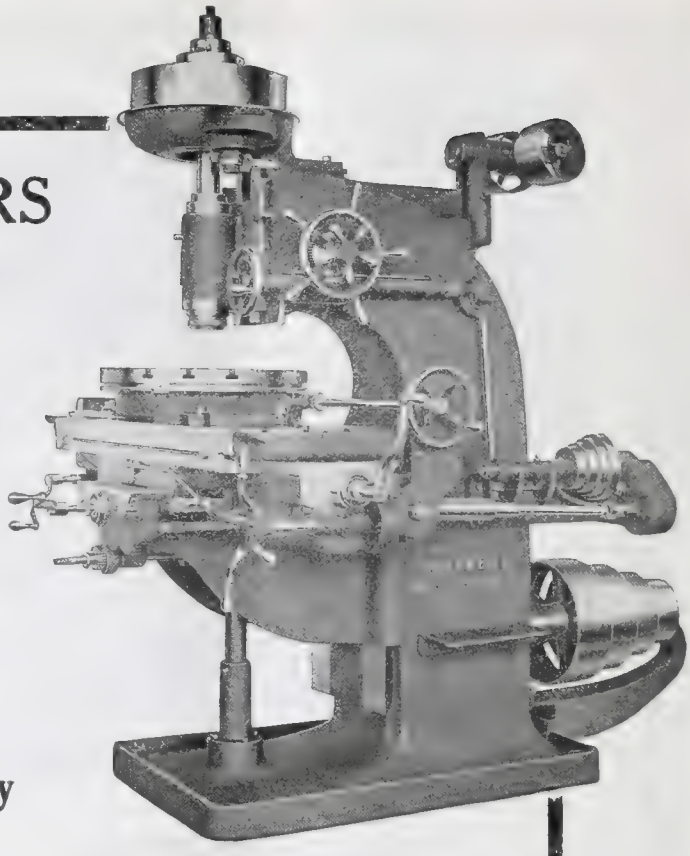
BECKER BELT-DRIVEN MILLERS

for

GREATER PRODUCTION because they work continuously—every hour of operation is a production hour—

ECONOMY OF OPERATION because they are power savers; the internal belt drive forms an elastic drive to the spindle that prolongs the life of the cutter by eliminating chatter and vibration.

ACCURACY because the machines have exceptionally fine feeds and are equipped with micrometer dials and stop gauges. The Patent Becker Gibbing keeps the work permanently aligned with the spindle.



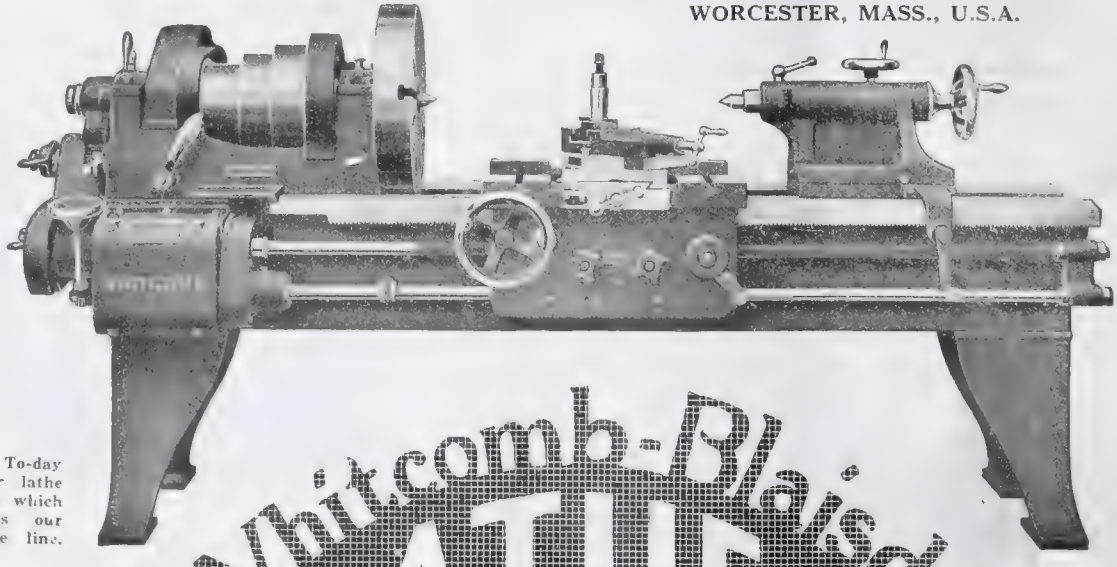
Becker Milling Machine Company
HYDE PARK, BOSTON, MASS.

A. R. WILLIAMS MACHINERY COMPANY, LIMITED, - 64 FRONT STREET WEST, TORONTO
RUDEL-BÉLNAP MACHINERY COMPANY, LIMITED, - 137 McGILL STREET, MONTREAL

Adapted to all kinds of Rapid Manufacturing

WHETHER your lathe requirements must suit the rapid manufacture of intricate parts or versatile demands of modern tool room practice, one of the Whitcomb-Blaisdell Line will fit exactly your individual needs.
When you buy a Whitcomb-Blaisdell Lathe you get a big measure of service in return for every dollar invested. The entire line of W-B Lathes is distinguished for superior design, workmanship and material.
Rigid inspection and thorough working tests in our shops are your assurance of accuracy and dependability.

Whitcomb-Blaisdell Machine Tool Co.
WORCESTER, MASS., U.S.A.



Write To-day for our lathe Catalog which describes our complete line.

Whitcomb-Blaisdell LATHES

STEEL CASTINGS

Mild Steel, High Carbon Steel, Manganese Steel, Chrome Steel

We are manufacturers of Steel Castings running from ½ lb. to 5,000 lbs. each and are in good position to furnish prompt deliveries at moderate prices. Try us with your next order.

The Wm. Kennedy & Sons, Limited, Owen Sound

ESTABLISHED 1860

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

Castings-Forgings

A FEW days lost in striving to ascertain where certain steel products can be obtained means money and prestige sacrificed—and a set-back to your policy of prompt delivery.

CUT delays to the minimum, and assure yourself of systematic co-operation by placing your orders for FORGINGS AND CASTINGS with us.

OUR equipment is as complete as a Foundries Equipment could be, our service organization Dominion-wide in scope, ever on the alert to give you practical, efficient service.

NO matter what your requirements be, we can supply you promptly. If service and quality count with you—we will eventually receive your enquiries.

DOMINION FOUNDRIES & STEEL, LIMITED

HAMILTON, CANADA

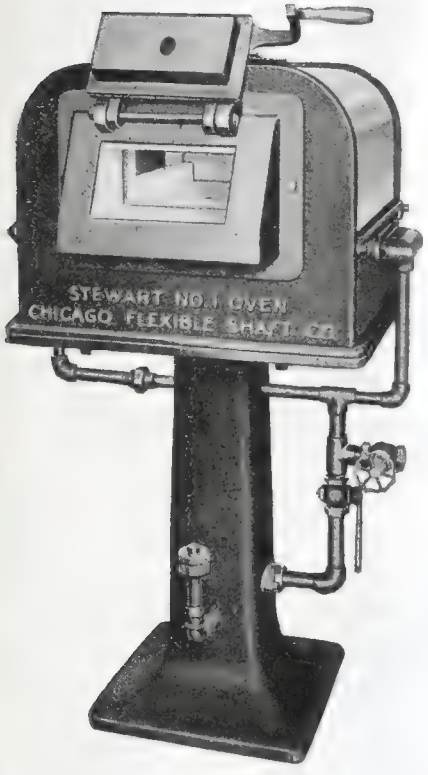
Opportunity Knocks Here Every Week!

It may not knock for **you** this week, but read these pages regularly and grasp the opportunity when it presents itself. Every ad here is an opportunity for someone! Your time is coming. If you think the time is ripe to spring that little proposition of yours, send in your copy now for the next issue. If it is of interest to our readers, rest assured it will get attention.

CANADIAN MACHINERY

Classified Advertising Section

143 University Avenue TORONTO



Gas or Oil-burning

Specifications:

Opening, 5 in. high, 9 in. wide x 13½ in. deep.

Floor space, 28 in.

Diameter of gas and air connections, 1¼ in.

Net weight, 950 lbs.

Shipping weight, 1,000 lbs.

Balanced door, $3.50 extra

Price, with blower....$121.50

Price, without blower. 91.50

F.o.b. Chicago.

Stewart Gas and Oil Furnaces For High Speed Steel

The sturdy Stewart No. 1 Oven Furnace, here illustrated, is one of our lines of indirect-heat furnaces for hardening high-speed and carbon steel, dies, tools, punches, cutters, springs, knives, etc.

It is also suitable for annealing or carbonizing small work.

The raised sides of its hearth prevent work from rolling off, while the open space above permits the hot gases from the combustion chamber beneath the slab to surge upward over the work, without coming in direct contact with it.

The lining of this furnace — heavier than need be—is of molded units of high-refractory fire clay. It lasts for years, with an occasional replacement of the hearth.

Relining is a matter of removing a few bolts and replacing the old "Monolith" with a new one, from our stock.

Positive and accurately-flexible control of heat, whether gas or oil are used, is an important factor in the widespread favor in which this line of furnaces is held, by heat-treating experts.

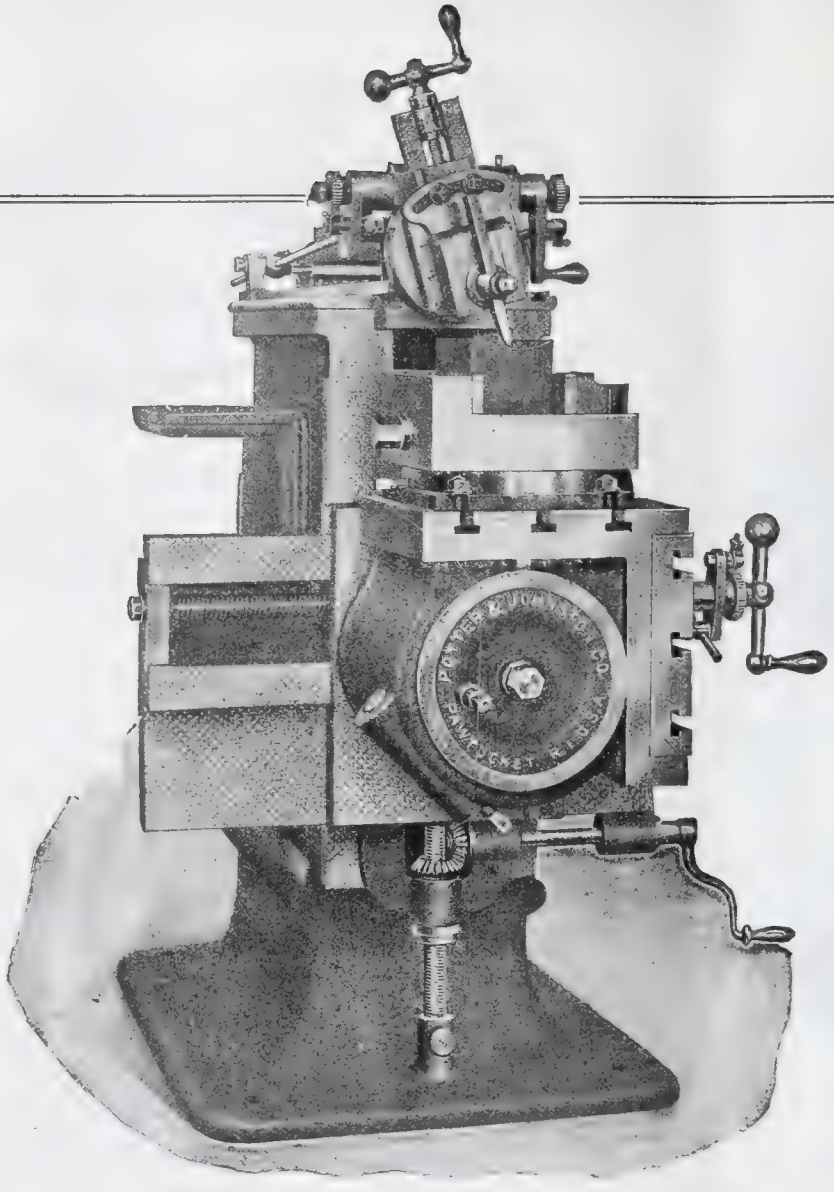
30-DAY TRIAL OFFER

All Stewart Furnaces are sold under positive guarantee of satisfactory performance; and we further show our faith in our products by offering to ship any stock size furnace, subject to acceptance after 30 days' trial.

Send for our catalogue.

Chicago Flexible Shaft Company

1148 So. Central Ave., Chicago, U.S.A.



Potter & Johnson 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15″ Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnson Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA

CONSOLIDATED

All the energy of America's most modern machine shop and foundry is concentrated upon one product.

CONSOLIDATED POWER PRESSES

CONSOLIDATED PRESS CO.

HASTINGS - MICHIGAN
U. S. A.

CONSOLIDATED

For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

CONSOLIDATED POWER PRESSES

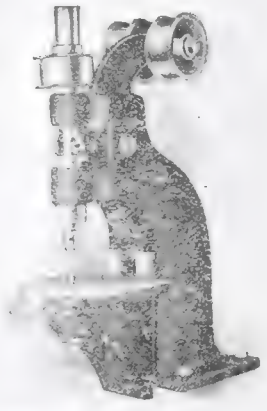
The GRANT

Spins a Polished Rivet Head Every Second Without Noise

A dozen of these GRANT ROTARY RIVET SPINNING MACHINES going at full speed would not awake a light sleeper in the same room.

The GRANT is fast. In one second it will quietly spin a polished rivet head without breaking or in any way marring the casting. It will rivet tight or loose, as required. The GRANT boosts the output, cuts the cost, and turns out perfectly accurate work.

Pleased to tell you more about it. Write.

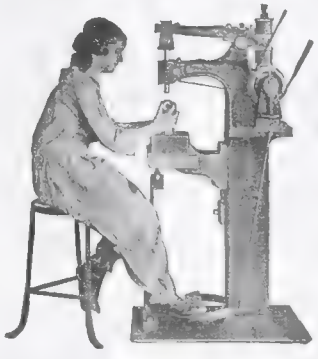


Grant Noiseless Rotary Rivet Spinning Machine

The Grant Mfg. & Machine Co.

Holland Ave., Bridgeport, Conn.

The Hammer With The Human Stroke



HEADS RIVETS COLD

Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:—

A rivet a second, sizes up to 3/16".
A rivet in two seconds, size ¼" to ⅜".
A rivet in three seconds, size 7/16" to ⅝".

And on special order we build machines to handle rivets up to 1½" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the High Speed Riveting Hammer does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

and

Let us shoulder your riveting problems.
Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.
ROCHESTER, N.Y.

THE TEST THAT SHOWS

When you can cut from a bar of about 20 carbon steel, reducing from 4 in. dia. to 2⅝ in., using a solid high speed tool and a European Tool Post, using in one feed .030 in. with a spindle speed of 41 R.P.M., cutting about 40 feet per minute, and in another feed .008, at a speed of 115 R.P.M., with a cutting speed of 110 feet per minute, cutting off about 8 cubic inches per minute, and the high speed tool will not stand up to any more,

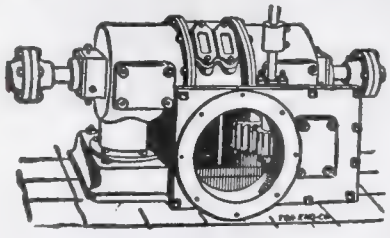
It shows the Power of
The Lathe with the Pull. 18 Inch Geared Head.

THERE IS NO MORE POWERFUL LATHE MADE THAN A CISCO
The Lathe of Simplified Accuracy

BUILT IN
14" - 16" - 18" - 24"
Engine or Tool Room
Cone Drive, Motor Drive, Geared Head
Motor Driven Geared Head

Made in
CINCINNATI, U.S.A.
by
THE CISCO MACHINE TOOL CO.

WATER POWER DEVELOPMENT



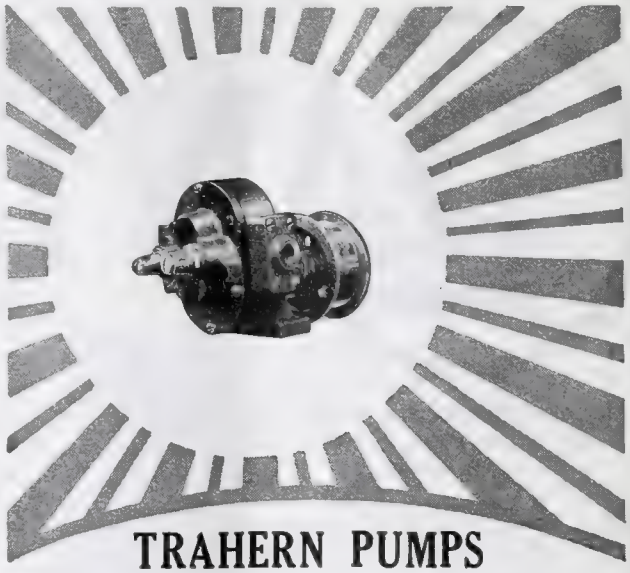
Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO



TRAHERN PUMPS

We positively guarantee that our pumps will deliver all the coolant that can be forced through the discharge opening, according to the size of the pump used, while operating from 300 to 500 R.P.M. A centrifugal pump delivering the same sized stream of lubricant must operate at a speed of at least 1000 R.P.M. This excessive rate of speed necessarily results in a short lived pump.

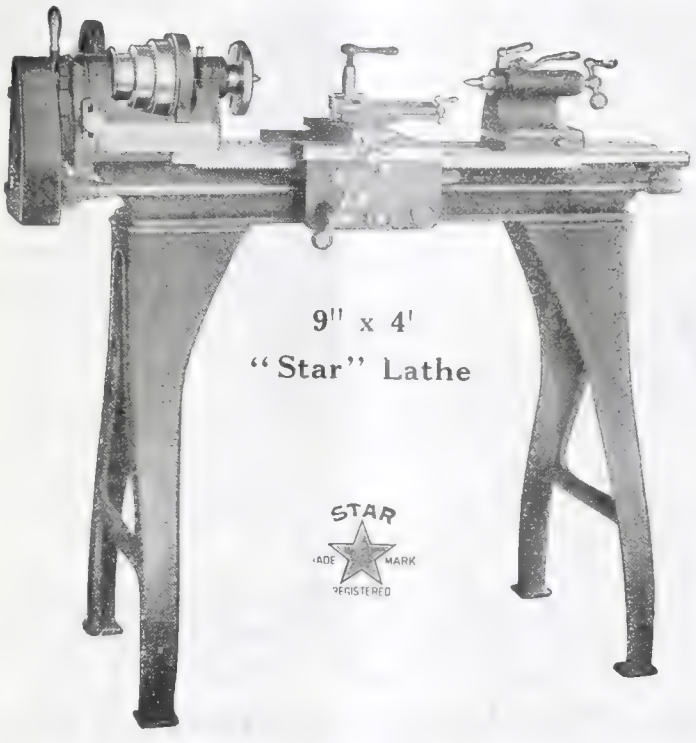
A Trahern operates at low speed and has long life.

Write for Particulars.

TRAHERN PUMP COMPANY
Rockford, Illinois

Canadian Agents: A. R. Williams Machy. Co., Toronto, Ont., Canada

Use a small lathe for your small jobs—



9" x 4'
"Star" Lathe

THINK

what a saving you can effect in space and overhead cost by using a small lathe for small work.

"STAR" LATHES
are built for small work

in tool rooms, scientific instrument shops, experimental departments and light, accurate commercial work generally. They are marvellous in their output and accuracy and very easily operated.

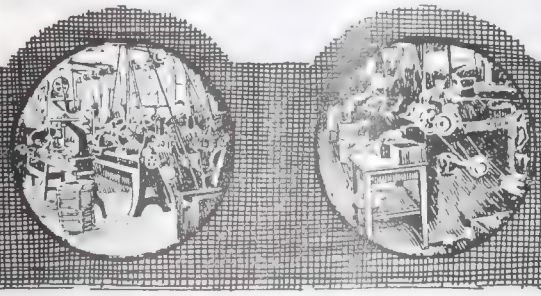
Drop us a line for new circular.

The Seneca Falls Mfg. Co., Inc.
366 W. Fall St.
Seneca Falls, N.Y.

SPECIAL TOOLS

Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems

Toronto Tool Company
516 Richmond St. West Phone Adel 1181



DUNBAR SPRINGS

ACCURACY ASSURED

You can always depend upon Dunbar Springs being accurate. Before proceeding with any order the first few springs are carefully tested and checked up for this very purpose.

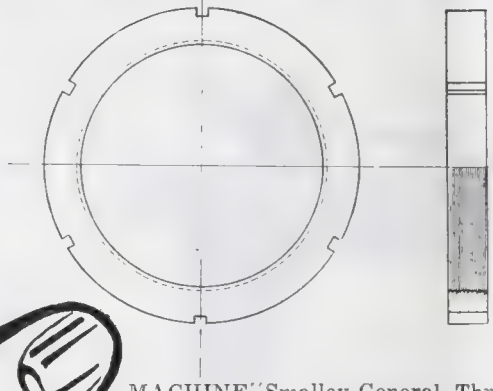
Seventy-two years' experience making flat and spiral springs of every description enables us to furnish you with springs of the highest quality, that can be depended upon under all conditions.

Send blue prints for estimates.

The Dunbar Brothers Co.
BRISTOL, CONN

Smalley-General Thread Miller Saves Time on Main Spindle Nut Work

A Concrete Example



A vital factor in competition to-day is speed in production. You need the Smalley-General Thread Miller for quantity work. Speed, convenience and accuracy are the features of this modern cost-cutter. The following time-study illustrates what it will do:

MACHINE—Smalley-General Thread Miller No. 2.
PIECE MACHINED—Main spindle nut.
THREAD—Diameter, 8″; length, 1¼″; 8 pitch U.S. Standard.
1. Work chucked.
2. Threaded surface milled from rough.
3. One side faced.
4. Put on mandrel. Turn other face and outside.

TIME—Milling operation, 1 min. 45 sec. Milling feed, 14.3″ per min.
MATERIAL—Cast iron.
TOTAL TIME in thread miller, floor to floor, 3¼ min.
NOTE—Smalley-General Thread Miller Method involves no more chuckings than in a lathe and saves much time. Also quality of work better.

Let us tell you more about the "Smalley."

Smalley-General Company, Inc.
Bay City, Michigan
Canadian Agents—Rudel-Belmap Co., Limited, Montreal and Toronto.

MORSE DRIVES

Flexible as a belt Positive as gears
Longer life than either

Our engineers, experts in the art of designing chain drives, will gladly call and assist in solving any power plant transmission problem without obligation.

We are always glad to furnish special information pertaining to our field, and welcome inquiries.

Send for INFORMATION
Address NEAREST office
FACTS will Surprise You

MORSE CHAIN CO.
Ithaca, N.Y.
ASSISTANCE FREE

Cleveland	New York	Pittsburgh	Montreal
Chicago	Greensboro, N.C.	San Francisco	Minneapolis
Boston	Detroit	Atlanta	St. Louis

"MORSE" is the guarantee always behind our Efficiency, Durability and Service

WILKINSON & KOMPASS

TORONTO HAMILTON WINNIPEG

IRON AND STEEL
HEAVY HARDWARE

Mill Supplies Automobile Accessories

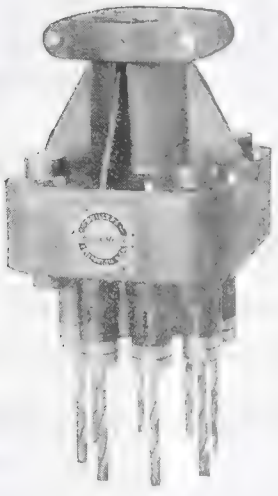
WE SHIP PROMPTLY

SMELTERS & WELDERS GOGGLES

We have a style to meet every requirement

Write for Catalogue
Consolidated Optical Company
Montreal Toronto Winnipeg Vancouver

2 Minutes or 20?



This Is The Vital Question

Do you drill ten holes in the time it takes for one? The Hoefer Auxiliary Head equips any driller so as to accomplish this big saving in time. It speeds up production in drilling tremendously. Not only do you save the drilling time, but also the time now lost in shifting the jigs and raising and lowering the spindle for the extra holes.

Hoefer Auxiliary Heads are made in any multiple, arranged in any manner, from 2 up. They are made by expert tool makers and unqualifiedly guaranteed to handle accurately the work for which they are designed.

Investigate now—every day you use a single drill where the multiple may be used you are paying for an auxiliary head through increased costs, but not securing its benefits.

Write for catalog. Send a blueprint of some of your work for estimate of time and cost.

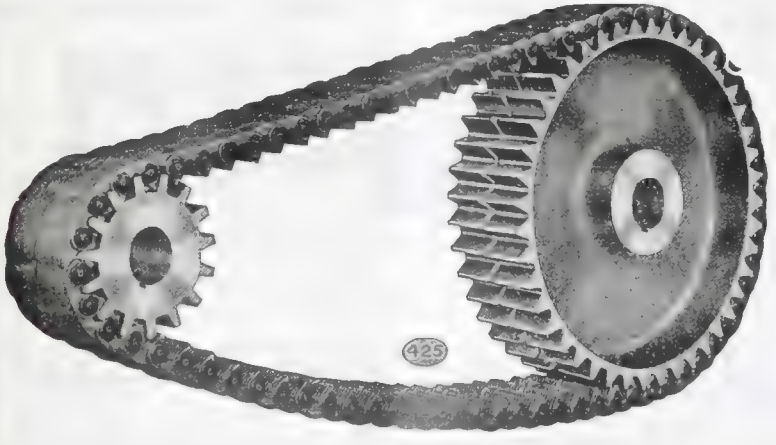
THE HŒFER Mfg. Co., Freeport, Ill.

621 Washington Blvd., Phone Haymarket 2408, Chicago, Illinois; 1113 Citizens' Bldg., Phone Main 795, Cleveland, Ohio; 708 Empire Building, Phone Court 1911 or 1912, Pittsburgh, Pa.; 602 Kerr Building, Phone Cherry 2884, Detroit, Mich.; 30 Church Street, Phone Cortland 1615, New York City; Badger-Packard Mchy. Co., Milwaukee, Wisconsin; National Supply Co., Toledo, Ohio.

The Canadian Fairbanks-Morse Co., Limited

"Canada's Departmental House For Mechanical Goods"

Halifax St. John Quebec Montreal Ottawa Toronto Hamilton Windsor Winnipeg Saskatoon Calgary Vancouver Victoria



Jones & Glassco (Reg'd)

ENGINEERS

MONTREAL AND TORONTO

Specialists in

POWER TRANSMISSION CHAINS

CANADIAN AGENTS FOR

"RENOLD"

Patent Silent and Bush Roller Chains

"MORSE"

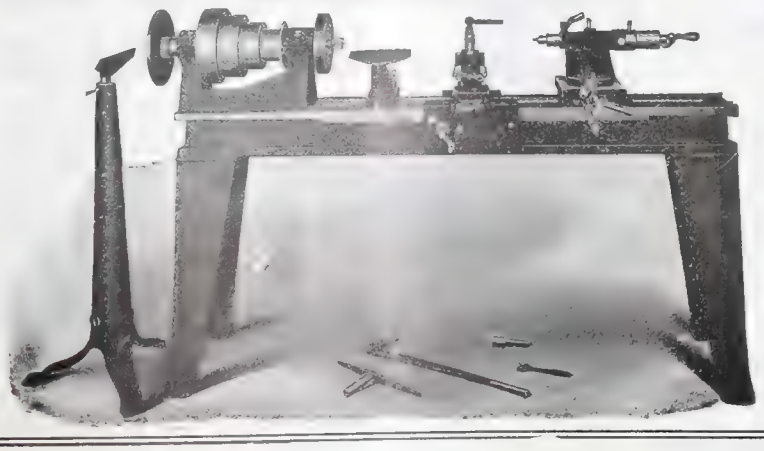
Rocker Joint Silent Chains

Chain Drives from ¼ H.P. to 5000 H.P. in successful operation

Write for particulars to

Head Office: St. Nicholas Building MONTREAL

Branch Office: 1204 Traders Bank Building TORONTO



A Favorite—

Blount Pattern-makers' Lathe

FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catalog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY

EVERETT, MASS., U.S.A.

HINTS TO BUYERS

CRANES
All Kinds
GEO. ANDERSON & CO. of CANADA, Ltd.
157 Craig St. W., MONTREAL, Que.

PRESSES and SHEARS
Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
26 Lansing St., BUFFALO, N.Y.

JAMES BALLANTYNE
HEATING and PLUMBING CONTRACTOR
ALSO
MACHINE SHOP and BLACKSMITH WORK
163 NAZARETH ST.
MONTREAL, P. Q.

Machine Work Wanted for Lathes, Shaper, Milling Machine and Planer, etc.

Quotations given on all classes of work. Wrought Iron Pipe Tends made to order, ¼ to 8". Pipe Cut and Threaded, ⅛ to 12".

Write for Prices.

TRADE MARK
BRISTOL'S
REG U.S. PAT OFFICE
ELECTRIC PYROMETERS
FOR EVERY SERVICE

Bristol's Recording Pyrometer furnished with patented frictionless smoked chart recording system especially valuable for processes requiring continuous heat treatment.

Simplicity of construction and ruggedness make them ideal shop pyrometers. The ONLY pyrometer equipped with Weston milli-voltmeter movement.

Write for Bulletin I-205.

THE BRISTOL CO.
WATERBURY, CONN., U.S.A

Skinner Independent Chucks

FOR HIGH SPEED WORK
IRON OR STEEL BODY

The last word in chuck construction.

Wide jaws; hardened steel thrust bearings; adjusting screws of large diameter threaded full length; jaws ground after hardening, etc

Write us to-day for prices.

THE SKINNER CHUCK COMPANY, New Britain, Conn.
New York Office: 94 Reade St., N.Y.
Factory and Main Office: New Britain, Conn.
London Office: 149 Queen Victoria Street
San Francisco Office: Rialto Building

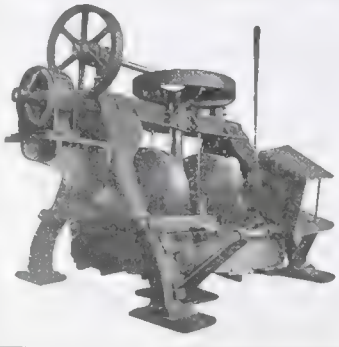
THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

May we send you catalogue C?

The F. B. SHUSTER COMPANY, New Haven, Conn.
Formerly John Adt & Son. Established 1866.
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

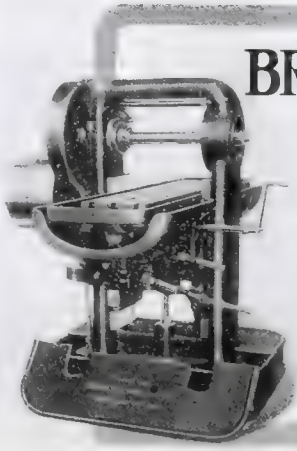
Canadian Steel Foundries Need Frost Improved Sand Mills



WINNING FEATURES

Heavy Mullers
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago



BRIGGS MILLERS

This Miller is breaking production records wherever introduced. It handles work no other machine of its size can touch and it does perfectly accurate work. Rigid, powerful, accurate.

We should like to show how "Briggs" adaptability and convenience can better output and lower costs for you. Get in touch with us.

Gooley & Edlund, Inc.
CORTLAND, N.Y.

FOREIGN AGENTS: Allied Machinery Co., of America, Paris, Turin, Zurich, Petrograd, Barcelona, Burton Griffiths & Co., Ltd., London, Manchester and Glasgow; Andrews & George, Tokyo.

IMPORTERS OF

WHEEL TRUEING TOOL CO.

DETROIT

MANUFACTURERS OF

INDUSTRIAL DIAMONDS

DIAMOND POINTED TOOLS

Goods Submitted on Memorandum if Desired

JOHN W. GORDON, Manager

5 James Street, ST. CATHARINES, ONTARIO

All Mountings Fully Guaranteed

Office and Factory:

88 West Pitt Street, WINDSOR, ONTARIO

DARLING BROTHERS, LIMITED

Engineers, Manufacturers and Founders

120 Prince Street, MONTREAL, P. Q.

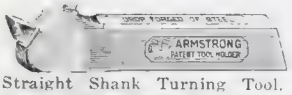
Pumps for any Service—Steam Appliances—Freight Elevators—Webster Vacuum Heating System.

OLIVER 30" Heavy Duty LATHE

A big, powerful, well proportioned lathe that will stand up under the heaviest service.

Write for descriptive literature

Oliver Machinery Co., Grand Rapids, Mich.



Straight Shank Turning Tool.

Boring Tool.

Straight Shank Cut-Off Tool.

Armstrong Tool Holders

Make One Pound of High Speed Steel go as far as Ten Pounds in Forged Lathe Tools.

Grand Prize Winners at Panama-Pacific Exposition

Complete Catalog Free

ARMSTRONG BROS. TOOL CO.

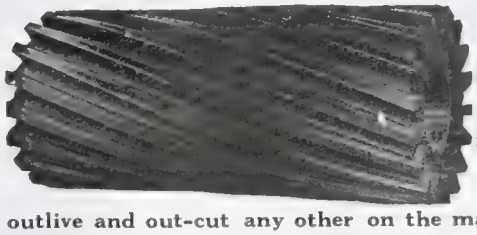
"The Tool Holder People."

306 N. Francisco Ave., Chicago, U.S.A.

Taylor-Newbold Milling Cutters

Fast Cutting

Power-ful



Inserted Helical Blades of High Speed Steel

Will outlive and out-cut any other on the market

4-in. Diameter for General Use.

Send for Bulletin R-P and 30-day trial offer.

THE TABOR MANUFACTURING COMPANY

PHILADELPHIA, PA., U.S.A.

Greenfield

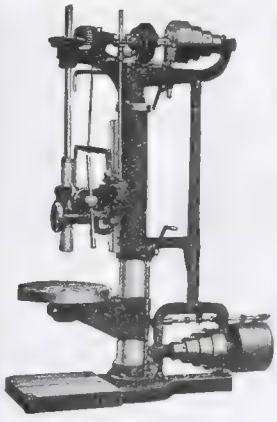
Trade Mark Reg. U. S. Pat. Office

A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.

Catalog No. 6.

Greenfield Machine Co.

Greenfield, Mass., U.S.A.



6 Positive Geared Feeds

instantly obtained, are but one of many advantages provided by

SILVER DRILLS

For 64 years these upright Drilling Machines have served well in the States and Canada.

Write for full description of our 20" and 25" sizes.

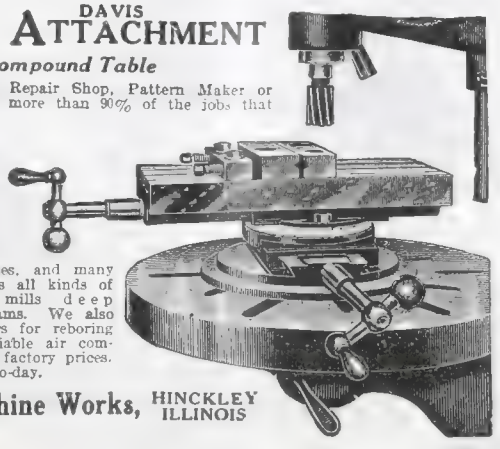
The Silver Manufacturing Co.

290 Broadway Salem, Ohio

THE DAVIS MILLING ATTACHMENT

and Compound Table

For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.



For any Drill Press 14" to 42" swing. Big Economy — Big Convenience— Small Price. It relieves your large millers, comes in handy spotting castings, milling ends of bosses, and many other odd jobs. Cuts all kinds of keyseats perfectly; mills deep grooves, slots and cams. We also make cylinder reamers for reboring Ford car, and a reliable air compressor—all at special factory prices. Write for circulars to-day.

Hinckley Machine Works, HINCKLEY ILLINOIS

NORTHERN CRANES

"MADE IN CANADA"

"Type D"

Electric Travelling Cranes, Hand Cranes, Electric Hoists, Air Hoists, Foundry Equipment, Cupolas, Ladles, etc., etc.

NORTHERN CRANE WORKS LIMITED

WALKERVILLE, ONTARIO

Blast Gate Supersedes Gate Valves and Stop Cocks

(Patented)

"Would certainly recommend this type of blast gate to anybody using pressure blowers."
CHAPMAN DOUBLE BALL BEARING CO. OF CANADA, LTD.
Toronto, Ont.

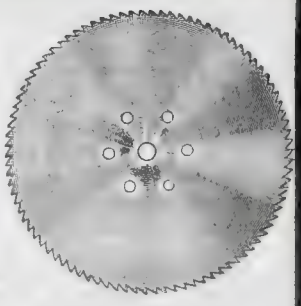
For low and moderate pressures our New Air Tight Blast Gate easily supersedes the heavy, cumbersome, expensive and slow-acting gate valves and stop cocks.

Costs only a fraction of what you pay for gate valves and stop cocks and saves time and labor.

Write for Circular 123-T. It tells how our blast gate is made, how it works and what users think about it.

W. S. ROCKWELL COMPANY
Furnace Engineers and Contractors
50 Church Street, New York (Hudson Terminal Bldg.)
Canadian Distributors: Drummond, McCall & Co., Ltd., Montreal.

HUNTER



Circular Metal Cutting Saw Blades

For Any Type of Machine

Unequalled for cutting Ingots, Bars, Forgings, Castings, Rails, Structural Shapes, etc. Sizes from 10" to 90" diameter.

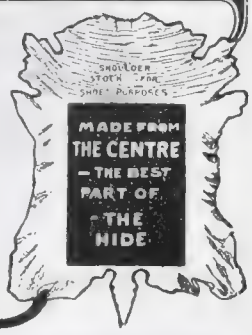
Hot Saws, Friction Discs, Solid Blades made from Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machine-Inserted Tooth Grinders, Hardened Steel Specialties, etc. Write for prices.

Hunter Saw & Machine Co., Pittsburg, Pa.

J. C. McLAREN BELTING

THE J.C. McLAREN BELTING OAK EXTRA TANNED EST 1856

Will Save You Money In Every Day of Service



Modern plant and thorough knowledge of requirements of belting guarantees perfect satisfaction to all buyers. Our belts are the result of using best leather, and our 57 year's experience.

Ask for Quotations.

J. C. McLAREN BELTING CO.
Limited
Montreal Toronto Winnipeg

GRAY IRON ALUMINUM BRASS

BROCKVILLE FOUNDRY CO
Brockville, Ontario

CASTINGS

Rochester Thrust Bearings

BALL THRUSTS

Big Ones - Little Ones. Special and Standard. All Good. Catalog.

ROCHESTER BALL BEARING CO., Inc.
ROCHESTER, N.Y.

OAKITE CLEANS

Our business is to solve your cleaning problem. Put it up to us!

OAKLEY CHEMICAL CO
44 THAMES STREET NEW YORK

Forrest, Jackson & Forrest

Engineers, Contractors and Manufacturers' Agents

Portable Cranes, Turntables, Transveyors, Plastic Metallic Packing

HEAD OFFICE : 222 Craig St. W., Montreal Can.

FOR EVERY INDUSTRIAL REQUIREMENT

WILLSON GOGGLES
REG. U.S. PAT. OFF.

ONE PAIR OR 20,000 PER DAY

WRITE FOR CATALOG

T. A. Willson & Co., Inc. *Canadian Office:* 23 Scott St., Toronto

CLUTCHES

Combined Jaw and Friction. Friction only. Gas Engine Clutches. Jaw Clutches.

Write for interesting printed matter.

The Positive Clutch & Pulley Works, Ltd., Canada
MONTREAL Factory: Aurora, Ont. TORONTO

GEAR

GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

In stock and to order, any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., 151 Pearl St. Boston, Mass. U.S.A.
G. B. GRANT

WE MANUFACTURE RIVETS of every description, 5/8 inch. dia. and smaller

PARMENTER & BULLOCH CO., LTD.
GANANOQUE, ONT.

ARMCO IRON Welding Rods

OXY-ACETYLENE ELECTRIC

make *Safe* welding easy

ARMCO IRON Rods are practically pure iron and are peculiarly free from the sulphur, phosphorus, slag, oxides and other impurities that ordinarily destroy the homogeneity of the weld.

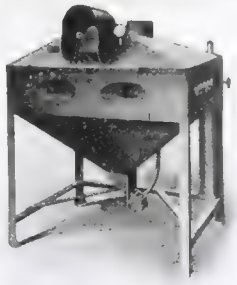
You will find it decidedly to your advantage to give ARMCO IRON Rods a careful test.

PAGE STEEL & WIRE CO.

Sales Offices: 30 Church St., New York

Plants: Monessen, Pa., and Adrian, Mich.

Western Representatives: Steel Sales Corporation, Chicago
Pacific Coast Representatives: American Rolling Mill Company, San Francisco.
Canadian Distributers: Taylor & Arnold, Limited, Montreal and Winnipeg.



Cleaning Your Product BY

Sand Blasting

will save money if you have the right equipment rightly installed.

A complete line with our competent Engineering Services assures you both.

"EA" Cabinet Sand Blast

PANGBORN CORPORATION
HAGERSTOWN, MD.
SAND-BLAST SPECIALISTS
P. O. BOX 8503

Oxy-Acetylene Welding and Cutting Apparatus

Carter Welding Co., General Dealers Toronto

For Davis-Bournonville Oxy-Acetylene Apparatus

General Office and Factory, Jersey City, N.J.
Canadian Factory, Niagara Falls, Ont.
Sales Offices: New York, Boston, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, San Francisco, Seattle.

Indicating CALIPERS

3" Graduated in 64th inches. Scale enlarges two times.

2" Graduated in 100ths inches. Scale enlarges three times.

PRICE
$8.75

Have Many Features

This simple, finely-made tool incorporates outside calipers, rule, magnifier, and indicator. Absolutely accurate, easily read and manipulated with one hand. Has many other features approved by machinists, pattern, tool and model makers.

Write for folder.

Made Exclusively by the
Indicating Calipers Co.
506 East 19th Street, New York

Exclusive Canadian Agents
WILLIAMS & WILSON, LIMITED
84 Inspector St., Montreal, Que.

NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING

Send for complete catalogue showing 50 styles 10 to 100 tons capacity.

Made only by **A. O. NORTON, Limited**
Coaticook, Prov. Quebec, Canada

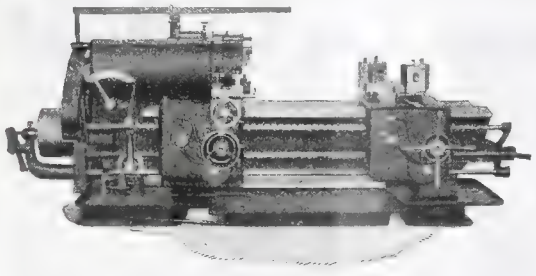
GIDDINGS & LEWIS MFG. CO.

FOND DU LAC, WIS.

Horizontal Boring, Drilling and Milling Machines, Sold in Canada by

Canadian Fairbanks-Morse Co., Ltd.

Montreal, Toronto, Ottawa, Hamilton, St. John, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria



TRY THE STEINLE WAY

LET US TELL YOU ABOUT THIS MACHINE

Send Us Prints of Your Work

STEINLE TURRET MACHINE CO.

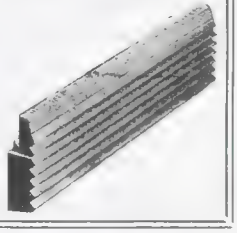
MADISON, WIS., U.S.A.

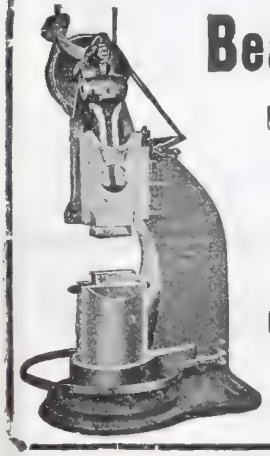
LANDIS MACHINE CO. INC.

WAYNESBORO, PENNA.

Manufacturers of BOLT and PIPE THREADING MACHINERY

Write for Catalogues:
No. 24—Bolt Threading Machinery
No. 25 Pipe Threading Machinery





Beaudry Hammers

FOR GENERAL FORGING

Save Fuel, Time and Labor. Cut Forging Costs in two.

BELT OR MOTOR DRIVEN

BEAUDRY & COMPANY, Inc.
141 Milk Street, Boston, Mass.

Alfred Herbert, Ltd., Coventry, England, London, Paris, Calcutta, Yokohama.

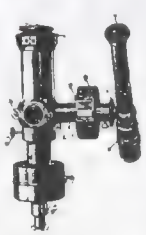
For Hardness Testing

in shop and laboratory use the

Standard Scleroscope

Universally adopted; direct reading inexpensive, and the only instrument that agrees with others of its kind in all parts of the world, thus solving problems of ordering materials to specification.

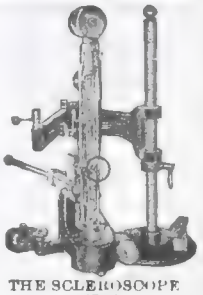
BOOKLET FREE



THE PYROSCOPE

Heat Indication

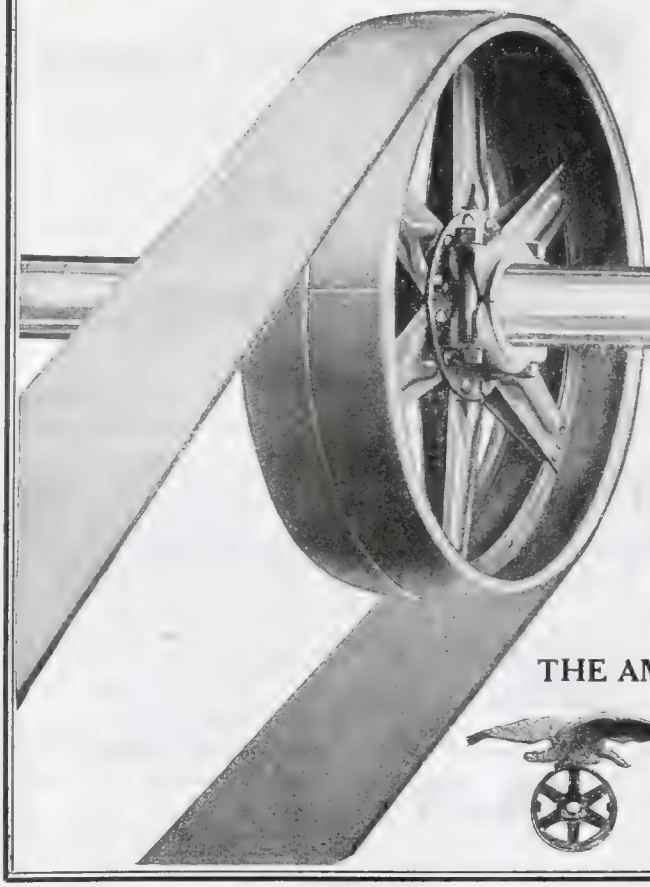
by optical means is fast becoming the correct thing. The PYRO SCOPE has solved the problem. Perfect constancy, inexpensive, no electricity used. Built to stand rough usage and upon common-sense lines. Used by the Government and best firms.



THE SCLEROSCOPE (Set)

Shore Instrument & Mfg. Co. 555-7 W. 22nd St. New York

Agents for Canada: A. R. Williams Machy. Co., Ltd., Toronto, Can.



Watch for Waste

In the keen manufacturing competition of to-day every little loss counts. If production is to reach its maximum efficiency all needless operating waste must be eliminated.

The pulley question is a vital one. Slipping belts and wind-fanning pulleys are responsible for big power losses.

The belt grips the whole face of the American Steel Split Pulley except the groove which acts as an air escape and prevents air cushioning and, consequently, excessive belt slip.

The flat A-braced arms cut the air and reduce wind resistance to a minimum.

An "American" Pulley is locked firmly on a shaft by means of four stout hub clamps without the use of keyways and set screws, except in special cases.

"Americans" are guaranteed to perform double belt duty under all ordinary conditions and are recommended for rim speeds up to 6000 feet per minute.

National distribution through supply houses from parent stocks in larger cities.

Write for our 37-page booklet, "Pulley Efficiency," a valuable treatise on pulleys.

THE AMERICAN PULLEY CO. Philadelphia, Pa.

AMERICAN STEEL SPLIT PULLEYS

THE

TRADE K–T MARK

FOUNDRY

GALT - ONT.

Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. **We can advise you** and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

—ASK US

STEEL CASTINGS

ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.

PROMPT DELIVERY

Manitoba Steel Foundries, Ltd.

1204 McArthur Building

Winnipeg - - - Manitoba

PRESSES—ALL TYPES

BAIRD

Press Attachments, Automatic.
Metal and Wire Forming Machines.
Tumblers—Large Line.
Burnishing Machines. Grinders.
Special Machines.

Baird Machine Co., Bridgeport, Conn., U.S.A.

Toronto Testing Laboratory LIMITED

METALLURGISTS CHEMISTS FUEL ENGINEERS

160 Bay St., Toronto.

Tests of Metals, Fuels, Oils, Water, Etc.

INDUSTRIAL RESEARCH

Canadian Machinery BUYERS DIRECTORY

If what you want is not here, write us, and we will tell you where to get it. Let us suggest that you consult also the advertisers' index facing the inside back cover, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

ABRASIVE MATERIALS
Aikenhead Hardware Co., Toronto, Ont.
Brantford Emery Wheel Co., Brantford, Canada
Canadian Fairbanks-Morse Co., Montreal.
The Geo F. Foss Mchy. & Supply Co., Montreal
Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
Plewes Ltd., Winnipeg, Man.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa
Rice, Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que

ACETYLENE
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont
Welding & Supplies Co., Montreal, Que.

ACETYLENE GENERATORS
Prest-O-Lite Co., Inc., Toronto, Ont
Welding & Supplies Co., Montreal, Que.

ACORN DIE AND HOLDERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

ACCUMULATORS, HYDRAULIC
Canadian Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que

AIR COMPRESSORS
Darling Bros., Ltd., Montreal, Quebec
Williams & Wilson, Limited, Montreal, Que

AIR CYLINDERS
Smalley-General Co., Inc., Bay City, Mich

AIR RECEIVERS
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que
Welding & Supplies Co., Montreal, Que.

AIR WASHERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

ALUMINUM
Canada Metal Co., Toronto.
United Brass & Lead, Ltd., Toronto
Tallman Brass & Metal Co., Hamilton
Williams & Wilson, Limited, Montreal, Que.

ALLOY, STEEL
Armstrong, Whitworth, of Canada, Montreal, Que
Boker & Co., Inc., H., Montreal Que.
Firth & Sons, Thos., Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hawkridge Bros. Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ARBORS
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto, Ont
Morse Twist Drill & Mach. Co., New Bedford, Mass
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Co., Walkerville, Ont.
Sheldons Ltd., Galt, Ont.
Pangborn Corporation, Hagerstown, Md.

AUTOGENOUS WELDING AND CUTTING PLANTS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

AUTOMATIC MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont
Gardner, Robt., & Son, Montreal.
National Acme Co., Cleveland, O., and Windsor
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto, Can.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

AUTOMATIC METAL CUTTING-OFF MACHINES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
The Geo. F. Foss Mchy & Supply Co., Montreal

AUTO SHEET METAL MACHINERY
Quickwork Co., St. Marys, Ohio.

AUXILIARY HEADS
Hooker Mfg. Co., Freeport, Ill.

BABBITT METAL
Canada Metal Co., Ltd., Toronto, Ont
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que

BAND SAWS
Oliver Machinery Co., Grand Rapids, Mich.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto
The Gray Ball Bearing Co., Ltd., Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Rochester Ball Bearing Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

BALLS, STEEL
The Gray Ball Bearing Co., Ltd., Toronto.
Boker & Co., Inc., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BALLS BURNISHING
The Gray Ball Bearing Co., Ltd., Toronto.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Katie Foundry, Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie, Ont.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BEADING MACHINES
Quickwork Co., St. Marys, Ohio

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont
Williams & Wilson, Limited, Montreal, Que

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT-LACING MACHINES, HOOKS AND PINS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

BELT HOOKS, WIRE
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Can. Consolidated Rubber Co., Ltd., Montreal.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

BELTING, CONVEYOR
Can. Consolidated Rubber Co., Ltd., Montreal
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BELTING, FRICTION AND SURFACE
Can. Consolidated Rubber Co., Ltd., Montreal

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal, Que.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.

BELTING, WOVEN
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENDING ROLLS (PLUTE & AUGH)
Wickes Bros., Saginaw, Mich.

BENDING MACHINERY
Bertram & Sons Co., John, Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BLASTING MACHINES, SAND
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.
Williams & Wilson, Limited, Montreal, Que.

BILLET MARKERS
Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste. Marie, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLACKSMITH WORK
James Ballantyne, Montreal.
The Thos. Pink Co., Ltd., Pembroke, Ont.

BLANKING
Henry Hope & Sons of Canada, Ltd., Peterboro.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

BLOW PIPES AND REGULATORS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont
Welding & Supplies Co., Montreal, Que.

BLUE PRINTING MACHINERY
Commercial Camera Co., Province, R.I.
Mulliner-Edlund Tool Co., Syracuse, N.Y
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co. of Can., Windsor, Ont.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal Que
Joyce, Koebel & Co., Inc., New York.

BOLT CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BOLTS, STAY
John Morrow Screw & Nut Co., Ingersoll, Ont.

BOLTS, SPRING SHAKLE
Can. Winkley Co., Ltd., Windsor, Ont.
Morrow Screw & Nut Co., Ltd., John, Ingersoll.

BOLTS, PATCH
John Morrow Screw & Nut Co., Ingersoll, Ont.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto.

BOLT THREADING MACHINERY
Jardine & Co., Ltd., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto
Canadian Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis
Gisholt Machine Co., Madison, Wis.
Hoefer Mfg. Co., Freeport, Ill.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis
Foss Mchy. & Supply Co., The Geo. F., Montreal
Oliver Machinery Co., Grand Rapids, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland, Ohio.

BRAKEBAND LINING CUTTERS
Peck, Stow & Wilcox Co., Southington, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland, Ont.

BRASS AND COPPER BARS, RODS

BRAKES, CORNICE
Peck, Stow & Wilcox Co., Southington, Conn.

AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.
Tallman Brass & Metal Co., Hamilton, Ont.

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co. Inc., Toronto, Ont.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BRICKS, FIRE
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

BRIDGES, RAILWAY AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.

BRONZE, COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville, Ont.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananogue, Ont.

BUSHINGS, BRONZE
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.

CALIPERS
Peck, Stow & Wilcox Co., Southington, Conn.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CALKS, BOOT
Lufkin Rule Co. of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co. Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBONIZING BOXES
Can. Driver-Harris Co., Ltd., Walkerville, Ont.
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal.

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Sheldons, Limited, Galt, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
Brockville Foundry Co., Brockville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd. Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland, Ont.

CARRIERS

COUPLING BOLTS
John Morrow Screw & Nut Co., Ingersoll, Ont.
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Sheldons, Limited, Galt, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que
Dominion Foundries & Steel, Ltd., Hamilton, Ont
Hull Iron & Steel Foundries, Ltd., Hull, Que
Kennedy & Sons, Ltd., Owen Sound

CASTINGS, MALLEABLE
International Malleable Iron Co., Guelph, Ont

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal
Gardner, Robt., & Son, Montreal

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAINS, AGRICULTURAL
Morse Chain Co., Ithaca, New York.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Williams & Wilson, Limited, Montreal Que.
Wright Mfg. Co., Lisbon, Ohio.

CHAINS, AUTOMOBILE ENGINE
Morse Chain Co., Ithaca, New York.

CHAINS, BICYCLE
Morse Chain Co., Ithaca, New York.

CHAINS, BLOCK
Morse Chain Co., Ithaca, New York,

CHAINS, DRIVE
Morse Chain Co., Ithaca, New York.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, New York.

CHAINS, SPROCKET WHEEL
Morse Chain Co., Ithaca, New York.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada
Canadian Fairbanks-Morse Co., Ltd., Montreal
Cushman Chuck Co., Hartford, Conn.
Foss Mchy & Supply Co., The Geo. F., Montreal
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London Conn
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, DRILL AND TAP
Swedish Gage Co., New York, N.Y.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa
Wells Bros. Co. of Canada, Galt, Ont

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A
Williams & Wilson, Limited Montreal, Que

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCK SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

If You Find

"MORSE"

Stamped upon a Reamer

THAT REAMER IS A REAMER

CATALOG ON REQUEST

Morse Twist Drill and Machine Company

NEW BEDFORD, MASS., U.S.A.

Cleveland Sand Rammers

FOR FLOOR, BENCH, PEIN AND FLASK RAMMING

Cleveland Sand Rammers are made in several sizes and weights, and are adapted for all kinds of Ramming in general foundry service.

The Piston Rods are packed with a resilient packing that conforms to the shape of Rod without retarding its free action, and prevents any dirt from entering piston chamber and working parts — Rammers are fitted with either Round or Flat Rods as required. Cleveland Rammers are light in weight, have high speed and practically no vibration, making them ideal foundry tools.

CLEVELAND CHIPPING HAMMERS

For General Foundry Work. Are furnished in any required size or weight for grey iron or steel castings; they have high speed, and are particularly adapted for fast chipping now required by piece-work operators.

BOWES AIR HOSE COUPLINGS

Standard Equipment Everywhere

Bowes Couplings are instantly connected or disconnected.

Bowes Couplings are absolutely air tight under all pressures.

Above cut shows the Never-Slip Clamp attached to Bowes Coupling

In Stock: RIVETING HAMMERS, DRILLS, REAMING, TAPPING AND FLUE-ROLLING MACHINES, CORNER DRILLS, PORTABLE AND BENCH GRINDERS, ETC

Write for Bulletins, 34A, 41 and 43.

ADDRESS ALL INQUIRIES TO:

CLEVELAND PNEUMATIC TOOL CO. OF CANADA, LIMITED

84 CHESTNUT STREET, TORONTO, ONT. **337 CRAIG ST. W., MONTREAL, QUE.**

Agents: A. R. WILLIAMS MACHINERY CO., TORONTO, ST. JOHN, N.B., VANCOUVER, WINNIPEG WILLIAMS & WILSON, MONTREAL.

Sand rammer in operation.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S

COKE AND COAL HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

COLD ROLLED STRIP, ALL METAL
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found'g & Forgings, Ltd., Welland, Ont

CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Welland Motor & Machine Co., Welland, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS, MAGNETIC BRAKES, ELEC. WINCHES, MONO RAIL HOISTS
Volta Mfg. Co., Welland, Ont.

CONTROLLERS AND STARTERS
Williams Machy. Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

CONVEYORS, BELT AND CHAIN
Can. Link Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

COOLERS, WITH DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

COOLERS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

COPING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Can. Blower & Forge Co., Kitchener, Ont.

COPPER, BUS BAR, SHEET, PLATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.

COUNTERSHAFTS
Almond Mfg. Co., T. R., Ashburnham, Mass.
The Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind
Williams & Wilson, Limited, Montreal, Que.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CUPS, OIL
Can. Winkley Co., Ltd., Windsor, Ont.

COVERS, OIL HOLE
Can. Winkley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Quebec.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Quebec.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Found'g & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURB PUMPS FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, BOLT
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTER HEADS
Oliver Machinery Co., Grand Rapids, Mich.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Curtis & Curtis Co., Bridgeport, Conn
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto, Ont
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis
Standard Mchy & Supplies, Ltd., Montreal, Que
Tabor Mfg. Co. Philadelphia, Pa
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.

CUTTING OIL, RECLAIMING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CUTTING AND WELDING PLANTS
Prest-O-Lite Co., Inc., Toronto, Ont
Welding & Supplies Co., Montreal, Que.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co. Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co. Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Anderson & Co. of Can., Geo., Montreal, Que.
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal, Que.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal.
Stoll Co., Inc., D. H., Buffalo, N.Y
Wells Brothers of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

DIES, THREADING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston, Mass.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES, BOLT, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FILING MACHINES
Oliver Machinery Co., Grand Rapids, Mich.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

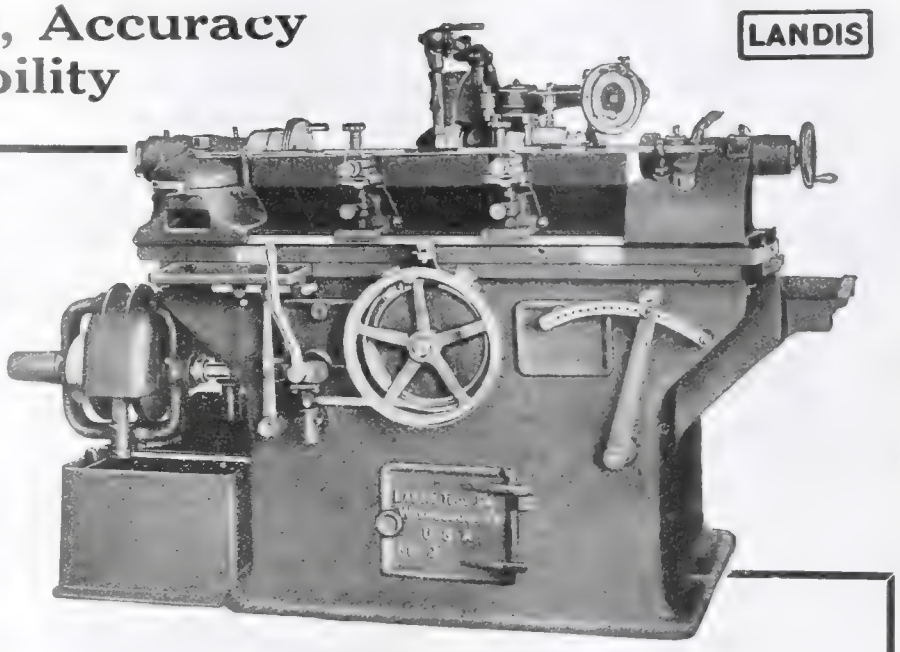
DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.

Big Capacity, Accuracy and Adaptability

LANDIS

Combining both an external and internal grinder, the Landis Universal Grinding Machine has proven of exceptional value in Tool Room work. It is also a rapid and accurate machine for manufacturing production.

It is unsurpassed for finishing straight and taper spindles, arbors, rolls, male and female gauges, dies reamers, plain, angular and forming milling cutters and a large variety of other work. The Landis name is your guarantee of Grinding machine efficiency.



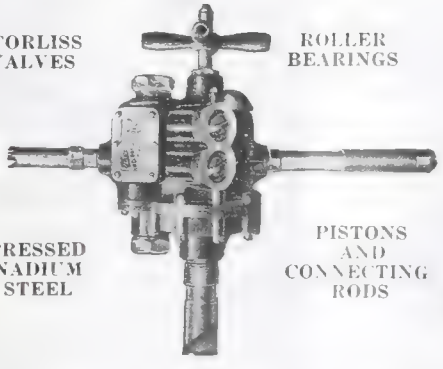
SEND FOR CATALOGUE

LANDIS TOOL CO., WAYNESBORO, PA.

NEW YORK: 50 CHURCH STREET

PNEUMATIC TOOLS

AIR DRILLS



Four cylinders — two on each side with Semi-Corliss Valve close to each pair, giving greater power and efficiency.

Thor

ALL RECORDS BROKEN FOR SPEED, POWER and ENDURANCE

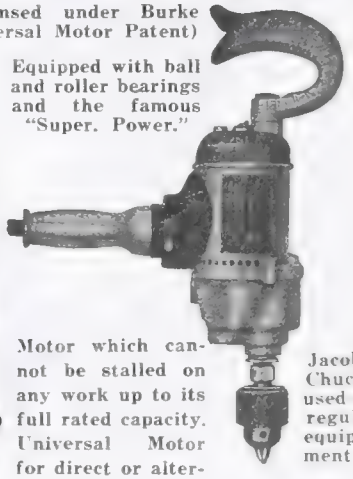
CHIPPING HAMMERS

4 Sizes, 1 in. to 5 in.
All parts hardened and ground

ELECTRIC DRILLS

(Licensed under Burke Universal Motor Patent)

Equipped with ball and roller bearings and the famous "Super. Power."



Motor which cannot be stalled on any work up to its full rated capacity. Universal Motor for direct or alternating current.

Jacob's Chucks used as regular equipment.

Independent Pneumatic Tool Company

General Offices :
600 West Jackson Blvd.
CHICAGO, U.S.A.

CANADIAN OFFICES: 334 St. James St., MONTREAL; 32 Front St., TORONTO; 123 Bannatyne Ave. E., WINNIPEG; 1142 Homer St., VANCOUVER.

Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Ltd., Montreal.

DIRECT CONNECTED UNITS
MacGovern & Co., Montreal, Que.

DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

DRAWING
Henry Hope & Sons of Canada, Ltd., Peterboro.

DRESSERS, GRINDING AND EMERY WHEEL
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont
Ford-Smith Mach Co., Hamilton, Ont.
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp, Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILL RODS
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hoefer Mfg. Co., Freeport, Ill.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.

DRILLING MACHINES RADIAL AND TURRETT
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont
Hoefer Mfg. Co., Freeport, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R McDougall Co., Galt.
National Automatic Tool Co., Richmond, Indiana
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill
Silver Mfg. Co., Salem, Ohio.
A R Williams Machinery Co., Toronto
Williams & Wilson, Ltd., Montreal, Que

DRILLING MACHINES, SPECIAL
Hoefer Mfg. Co., Freeport, Ill.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis

DRILLING MACHINES, WALL RADIAL
Lynd-Farquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, CARBON
John Morrow Screw & Nut Co., Ingersoll, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilt Twist Drill Co of Canada, Walkerville, Ont
Wilkinson & Kompass, Hamilton, Ont
Williams & Wilson, Limited, Montreal, Que

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont
Independent Pneumatic Tool Co., Chicago, Ill

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Cleveland Twist Drill Co., Cleveland
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont
Morrow Screw & Nut Co., John, Ingersoll, Ont
Morse Twist Drill & Mch. Co., New Bedford, Mass
Pratt & Whitney Co., Dundas, Ont
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Wilt Twist Drill Co. of Canada, Walkerville, Ont
United Brass & Lead, Ltd., Toronto.

DRINKING FOUNTAINS, SANITARY
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal
Morse Chain Co., Ithaca, N.Y.

DRIVING TOOLS
The Thos. Pink Co., Ltd., Pembroke, Ont.

DRY CLEANING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
Band Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A R Williams Machy. Co., Toronto.

ELECTRICAL RESISTANCE MATERIALS, NICHROME, KROMORE, CHROMAX, CLIMAX, NICKEL, SILVER, ADVANCE
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMBOSSING PRESSES
Oliver Machinery Co., Grand Rapids, Mich.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Baxter & Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Trueing Tool Co., Windsor, Ont.

END MILLS
John Morrow Screw & Nut Co., Ingersoll, Ont.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE LATHES
Oliver Machinery Co., Grand Rapids, Mich.

ENGINES, MARINE
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL
J F A Comstedt, New York City, N.Y

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn

EXTRA TOOL STEEL
J F A Comstedt, New York City, N.Y.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont.
United Brass & Lead, Ltd., Toronto.

EYE PROTECTORS
Strong, Kennard & Nutt Co., Cleveland, Ohio

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich

FANS
Baird Machine Co., Bridgeport, Conn
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

FENCE, IRON AND FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

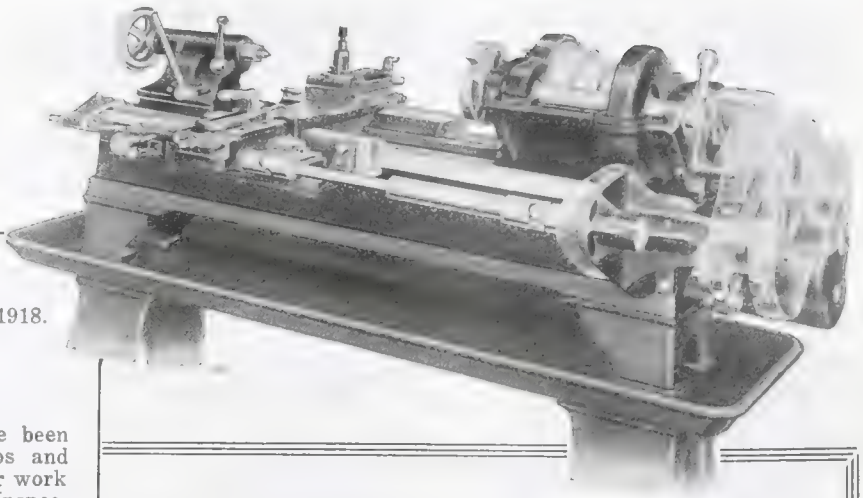
FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa

FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

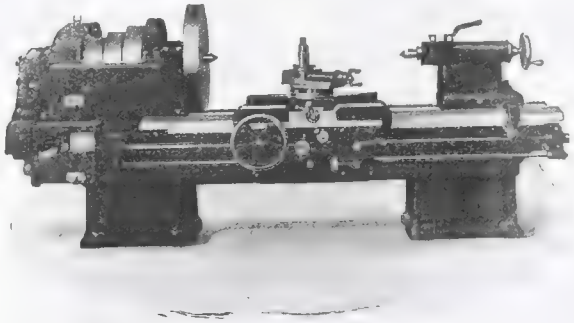
The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

SIDNEY

Sidney for Service

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohio

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

FILES
Wm. Atkns & Co., Sheffield, Eng.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Marshall, Son & Bunney, Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

FIRE BRICKS
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

FIRE EXTINGUISHERS
Strong, Kennard & Nutt Co., Cleveland, Ohio

FIXTURES
Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

FLAT SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

FORGINGS, STEEL AND IRON
Can. Foundries & Forgings, Ltd., Welland, Ont
Nova Scotia Steel & Coal Co., New Glasgow N S

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE

FORGING AND WELDING
Victoria Foundry Co., Ottawa.
Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

FORGINGS, SPECIAL
Armstrong, Whitworth of Canada, Montreal, Que
Canada Foundries & Forgings, Ltd., Welland, Ont
Williams & Co., J. H., Brooklyn, N.Y.

FORMING
Henry Hope & Sons of Canada, Ltd., Peterboro.

FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FOUNTAINS, DRINKING
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING
Can. Consolidated Rubber Co., Ltd., Montreal

FUEL OIL SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Gilbert & Barker Mfg. Co., Springfield, Mass.

FURNACES, ANNEALING, CASE HARDENING AND TEMPERING
Bellevue Furnace Co., Detroit, Mich.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical Engineering Co., Three Rivers, Que.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

FURNACES, BLAST
Belleview Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

FUSE BOXES, STEEL
Dom. Forge & Stamping Co., Walkerville, Ont

GAUGES, MANUFACTURERS, LIMIT, THREAD
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE TANKS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind

GAUGES
Elliott & Whitehall Mach. & Tool Co., Galt, Ont

GAUGES, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
C. E. Johanson, Inc., Toronto, Ont.
Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, VACUUM AND PRESSURE
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GAGES, SNAP, THREAD AND CYLINDRICAL
C. E. Johanson, Inc., Toronto, Ont.

GEAR BLANKS
Can. Steel Foundries, Ltd., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEAR BOXES, REDUCTION
Coventry Cham Co., Coventry, Eng.

GEARS, CHAIN
Morse Chain Co., Ithaca, New York.

GEARS, COMPENSATING
Morse Chain Co., Ithaca, New York.

GEARS, CUT, MORTISE, ANGLE, WORM
Baxter & Co., Ltd., J R., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

GEARS, SPRING
Morse Chain Co., Ithaca, New York.

GENERATORS, ELECTRIC
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GENERATORS, MOTOR
MacGovern & Co., Montreal, Que.

GERMAN SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLOVES, ASBESTOS, ACID PROOF, WATERPROOF, ETC.
Strong, Kennard & Nutt Co., Cleveland, Ohio.

GLUE HEATERS
Oliver Machinery Co., Grand Rapids, Mich.

GLASSES, SAFETY
Strong, Kennard & Nutt Co., Cleveland, Ohio
Willson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
Aikenhead Hardware, Ltd., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.

GOGGLES
Consolidated Optical Co., Toronto, Ont.
Standard Optical Co., Geneva, N.Y.
Strong, Kenard & Nutt Co., Cleveland, Ohio
Willson & Co., Inc., T. A., Reading, Pa.
Welding & Supplies Co., Montreal, Que.

GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS
Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (SEE LUBRICANTS)

GRINDERS, AUTOMATIC KNIFE
W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH
Wisconsin Electric Co., Inc., Racine, Wis.
Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co. Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, DIE AND CHASER
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
United States Electrical Tool Co., Cincinati, O.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que

GRINDERS, PORTABLE, ELECTRIC, HAND, TOOL POST, FLOOR AND BENCH
daird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Wisconsin Electric Co., Inc., Racine, Wis.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, ROTARY SURFACE
Bristol Machine Tool Co., Bristol, Conn.

GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Wing & Son, J. E., Hamilton, Ont.

GRINDERS, UNIVERSAL, PLAIN
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Reed-Prentice Co., Worcester, Mass.
Gisholt Machine Co., Madison, Wis.
Norton Grinding Co., Worcester, Mass
Williams & Wilson, Limited, Montreal, Que.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
LeBlond Mach. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York, N.Y.
Norton Grinding Co., Worcester, Mass.

Tools That Retain Their Keen Edges After Long Usage

The condition of Tap, Die and Reamer after long usage proves the stuff they're made of and determines their real value.

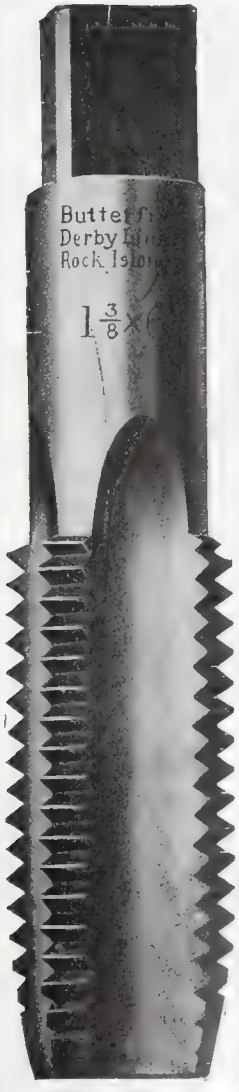
Try Butterfield and you'll say they're the cheapest in the long run.

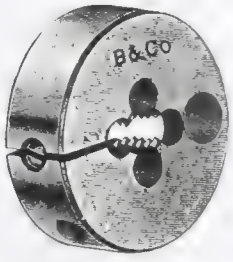
Butterfield

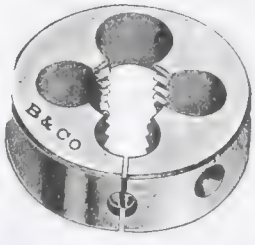
Taps, Dies & Reamers

Butterfield Tools assure the utmost in accuracy and they take heavy cuts with an ease and speed that make the best material look soft.
Let us make you acquainted with them now by sending a trial order.

Ask for catalogue.







Butterfield & Co., Inc.
Rock Island, P.Q.
Toronto Office: 220 King St. West

22

Wisconsin Electric Co., Racine, Wis.
Williams & Wilson, Limited, Montreal, Que.

GRINDING MACHINES, CAR WHEEL, CUTTER, CYLINDRICAL, CRANKSHAFT
Norton Grinding Co., Worcester, Mass.

GRINDING WHEELS
Aikenhead Hardware Co., Toronto, Ont.
Baxter Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Mahcine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Norton Co., Worcester, Mass.

GRIT, ANGULAR
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

GUARDS, WINDOW AND MACHINE
Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.
Strong, Kennard & Nutt Co., Cleveland, Ohio.

GUN AND AMMUNITION SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

GUN TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

HANDLES, BALANCE, CRANK AND MACHINE
Williams & Co., J. H., Brooklyn, N.Y.

HACK SAW BLADES
Aikenhead Hardware Co., Toronto, Ont.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Ford-Smith Machine Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Fry's (London), Ltd., London, England.
Racine Tool & Machine Co., Racine, Wis.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que
Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

HACK SAW FRAMES
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

HACK SAWS, POWER
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Ford-Smith Machine Co., Hamilton, Ont.
McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

HAMMERS (DROP), MOTOR AND BELT DRIVEN
Beaudry & Co., Boston, Mass.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Limited, Montreal, Que.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited Montreal, Que.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh, Pa.

HAMMERS, NAIL MACHINE
Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston Mass.

HAMMERS, STEAM
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
Beaudry & Company, Inc., Boston, Mass.

HAND PLANERS
Oliver Machinery Co., Grand Rapids, Mich.

HAND LEATHERS OR PADS
Graton & Knight Mfg. Co., Montreal.

HANGERS, SHAFT
Algoma Steel Corp., Sault Ste. Marie, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

HARDNESS TESTING INSTRUMENTS
Shore Instrument & Mfg. Co., New York.

HEAD, AUXILIARY
Hoefer Mfg. Co., Freeport, Ill.

HEATING AND VENTILATING ENGINEERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

HEATING AND PLUMBING CONTRACTS
James Ballantyne, Montreal.

HEAT TREATMENT OF STEEL
The Gray Ball Bearing Co., Ltd., Toronto.

HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

HELMETS, SANDBLAST, AMMONIA
Strong, Kennard & Nutt Co., Cleveland, Ohio.

HIGH SPEED STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

HIGH SPEED TOOL ROOM DRILLS
Albany Hardware Spec. Co., Albany, Wis.

HIGH SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.
J. F. A. Comstedt, New York City, N.Y.

HINGE MACHINERY
Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES
London Bolt & Hinge Works, London, Ont.

HOBS
Greenfield Tap & Die Corp., Greenfield, Mass.
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.

HOISTS, AIR
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

HOISTING AND CONVEYING MACHINERY AND ENGINES
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, CHAIN AND PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, ELECTRIC
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

HOOKS, BELT LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

HOPPERS
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

HOSE, PNEUMATIC
Baxter & Co., Ltd., J. R., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

HOSE, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

HYDRAULIC MACHINERY
Garlock-Walker Machinery Co. Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa
Williams & Wilson, Limited, Montreal, Que.

HYDROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

INDICATORS, SPEED
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
Fred C. Dickow, Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal, Que.

INDICATING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

INGOT METAL
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
United Brass & Lead Ltd., Toronto.

INGOTS, STEEL
Nova Scotia Steel & Coal Co., New Glasgow, N.S

INGOTS, FORGING AND ROLLING
Electric Steel & Metals Co., Welland, Ont.

INSTRUMENTS, ENGINEERING
Consolidated Optical Co., Toronto, Ont.

IRON GREY
Brockville Foundry Co., Brockville, nt.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

IRON SAND
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

IRON, WROUGHT, ROLLED AND PIG
Swedish Steel & Importing Co., Ltd., Montreal

IRREGULAR CUTTING SHEARS
Quickwork Co., St. Marys, Ohio.

JACKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK
Canadian Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

JAWS, FACE PLATE
Oushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JOINTERS
The Gray Ball Bearing Co., Ltd., Toronto.

JIGS, TOOLS, ETC.
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt.
Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.

JOURNAL WEDGES
Canada Foundries & Forgings, Ltd., Welland, Ont.

KEY SEATERS
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

KEYS, MACHINE
Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

KILNS
Can. Blower & Forge Co., Kitchener, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

KNIFE GRINDERS
The Gray Ball Bearing Co., Ltd., Toronto.

LABELS AND TAGS
Matthews, Jas. H. & Co., Pittsburgh, Pa.

LABORATORIES, INSPECTION AND TESTING (SEE CHEMISTS)

LADLES, FOUNDRY
Northern Crane Works, Walkerville.

LACING MACHINES
Clipper Belt Lacer Co., Grand Rapids, Mich.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

LATHES, CHUCKING
Acme Machine Tool Co., Cincinnati, Ohio.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHE CHUCKS (SEE CHUCKS)

LATHE DOGS AND ATTACHMENTS
Armstrong Bros. Tool Co., Chicago.
Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

LATHES, AUTOMATIC AND SEMI-AUTOMATIC
Gisholt Machine Co., Madison, Wis.
Wood Turret Machine Co., Brazil, Ind.

LATHES, AXLE
Bridgeford Mach. Tool Works, Rochester, N.Y

LATHES, BORING
Bridgeford Mach. Tool Wks., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que

LATHES, PRECISION, BENCH
W. F. & John Barnes Co., Rockford.
Blount, J. G., & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn
Pratt & Whitney Co., Dundas, Ont
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que

LATHES, BAND TURNING
Roelofson Machine & Tool Co., Toronto, Ont.

LATHES, BRASS
Acme Machine Tool Co., Cincinnati, Ohio
Hardinge Bros., Inc., Chicago, Ill.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que

LATHES, ENGINE
Acme Machine Tool Co., Cincinnati, Ohio
John Bertram & Sons Co., Dundas
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.

STOCO "CELOGLAS"

SHATTER-PROOF LENS

SAFETY GOGGLES

ADEQUATE eye protection not only preserves eyesight under hazardous conditions, but also makes your men better workmen. The man who is constantly dodging, or fearing eye injury, is not a competent workman.

STOCO safety goggles with Celoglas shatter-proof lenses are the best possible eye protection. The frame itself is light weight and comfortable but very strong Celoglas lenses, even when fractured, will not leave the frame or pieces fly into the eyes of the wearer.

Made with elastic headbands as illustrated or with easy cable ear-bows at the same price.

STOCO safety goggles with Celoglas lenses, $1.50 per hundred pairs.

With regular heavy weight optical glass lenses, $1.15 per hundred pairs.

You are invited to test the STOCO goggle without expense or obligation. A sample will be sent free on request to any Superintendent, Safety Engineer or Purchasing Agent.

STANDARD OPTICAL CO.

GENEVA, N.Y.

Cisco Machine Tool Co., Cincinnati, Ohio.
Wickes Bros., Saginaw, Mich.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
Kennedy & Sons, Wm., Owen Sound, Ont.
R. McDougall Co., Galt.
Miles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
Smalley-General Co., Inc., Bay City, Mich.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Sidney Tool Co., Sidney, Ohio.
Standard Machy. & Supplies, Ltd., Montreal, Que
Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blasdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

LATHES, FOOT POWER
Seneca Falls Mfg. Co., Seneca Falls, N.Y.

LATHES, HORIZONTAL
Wood Turret Machine Co., Brazil, Ind.

LATHES, METAL TURNING
Cisco Machine Tool Co., Cincinnati, Ohio
Williams & Wilson, Limited, Montreal, Que.

LATHES, JOURNAL TRUEING
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, PATTERNMAKERS'
J. G. Blount Co., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Wood Turret Machine Co., Brazil, Ind.
Geo F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, POLISHING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SINGLE PURPOSE
Baxter & Co., Ltd., J. R., Montreal, Que.
Bertram John, & Sons Co., Dundas Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SCREW CUTTING
Bertram, John, & Sons Co., Dundas, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Whitcomb-Blaisdell Mach. Tool Co., Worcester Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPEED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPINNING
Bliss, E. W., Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TOOL ROOM
Cisco Machine Tool Co., Cincinnati, Ohio.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TURRET, HAND, HORIZONTAL
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram, John, & Sons Co. Dundas Ont.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
H. C. Dodge, Inc., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

LEAD BURNING
St. Lawrence Welding Co., Montreal, Que.

LEAD BURNING OUTFITS
Turner Brass Works, Sycamore, Ill

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LENSES FOR GOGGLES
Standard Optical Co., Geneva, N.Y.

LIDS, SCREW TOP AND HINGE
Can Winkley Co., Ltd., Windsor Ont.

LIFTS, PNEUMATIC
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LOADERS, WAGON AND TRUCK
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.

LUBRICANTS
Cataract Refining & Mfg. Co., Toronto.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

LUMBERMEN'S TOOLS
The Thos. Pink Co., Ltd., Pembroke, Ont.

MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal, Que.
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Marten Mach. Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, MULTI-DRILLING
National Automatic Tool Co., Richmond, Ind.

MACHINERY, TRANSMISSION (POWER)
Morse Chain Co., Ithaca, New York.

MACHINES, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, ROLLING AND BENDING
Stull Co., Inc., The D. H., Buffalo, N.Y.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

MACHINES, MULTI-BORING
National Automatic Tool Co., Richmond, Ind.

MACHINE SHOP WORK
James Ballantyne, Montreal.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MACHINE TOOLS
Williams & Wilson, Limited, Montreal, Que.

MACHINE & REPETITION WORK
Katie Foundry, Ltd., Galt, Ont.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co. of Canada, Ottawa, Ont.
Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MASKS, WELDING, SMOKE, FUME, GAS, ETC.
Strong, Kennard & Nutt Co., Cleveland, Ohio

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Toronto Testing Laboratory, Ltd., Toronto.

METAL SAWS
Simonds Mfg. Co., Fitchburg, Mass.
Hoefer Mfg. Co., Freeport, Ill.

METAL SAWS, POWER
Hoefer Mfg. Co., Freeport, Ill.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que
United Brass & Lead Ltd., Toronto.

METAL STAMPINGS, SMALL
Can. Winkley Co., Ltd., Windsor, Ont.

METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Taylor, J. A. M., 315 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

MILLING ATTACHMENTS
Becker Milling Machine Co., Boston, Mass.
Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
The Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

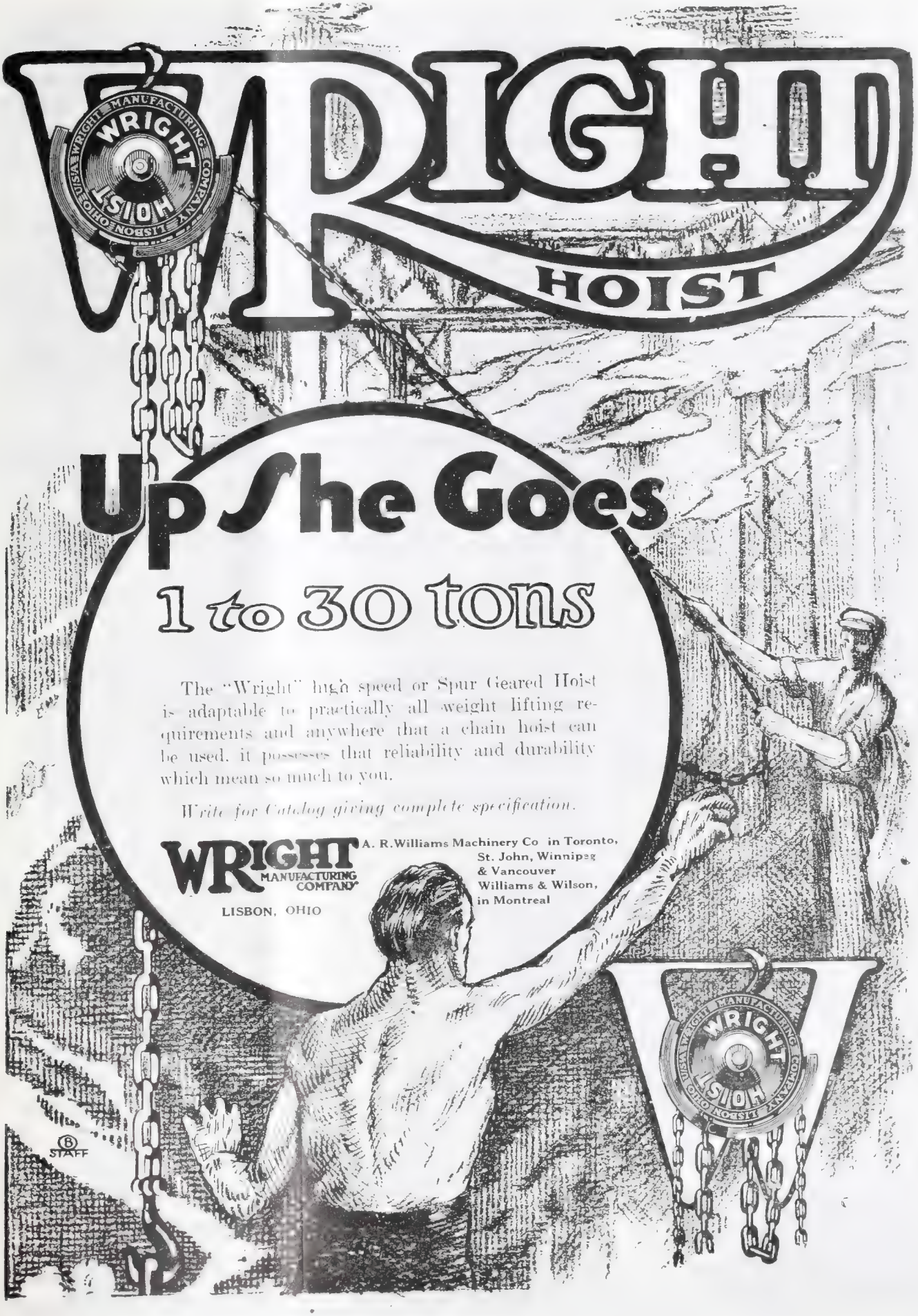
MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

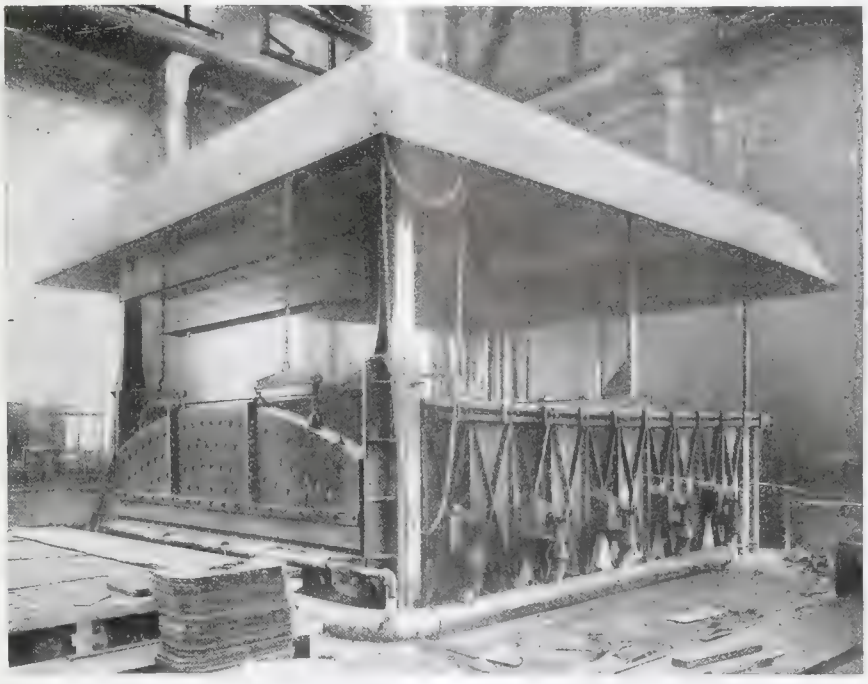
MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.


WRIGHT
HOIST
Up She Goes
1 to 30 tons
The "Wright" high speed or Spur Geared Hoist is adaptable to practically all weight lifting requirements and anywhere that a chain hoist can be used, it possesses that reliability and durability which mean so much to you.
Write for Catalog giving complete specification.
WRIGHT MANUFACTURING COMPANY
LISBON, OHIO
A. R. Williams Machinery Co in Toronto, St. John, Winnipeg & Vancouver
Williams & Wilson, in Montreal
STAFF

MOTOR SPRINGS
The Dunbar Brothers Co., Bristol, Conn.
MOTORCYCLE FRAME AND FORK
The Dunbar Brothers Co., Bristol, Conn.
MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.
MOULDS, RUBBER
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.
MULTI-DRILLING MACHINERY, VERTICAL AND HORIZONTAL
The National Automatic Tool Co., Richmond, Ind.
MULTI-BORING MACHINES
The National Automatic Tool Co., Richmond, Ind.
MULTI-TAPPING MACHINERY, VERTICAL AND HORIZONTAL
The National Automatic Tool Co., Richmond, Ind.
MUNTZ METAL
Brown Copper & Brass Roller Mills, New Toronto, Ont.
NAILS
Graham Nail Works (operated by Canada Metal Co., Ltd.), Toronto.
Page Steel & Wire Co., Adrian, Mich.
NAIL SETS
Morrow Screw & Nut Co., John, Ingersoll, Ont.
NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.
NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.
Turner Brass Works, Sycamore, Ill.
NICHROME CASTINGS
Can. Driver-Harris Co., Ltd., Walkerville, Ont.
NICKEL
Boker & Co., Inc., H., Montreal, Que.
NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
NICKEL STEEL
J. F. A Comstedt, New York City, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.
NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.
NITROGEN
Carter Welding Co., Toronto, Ont.
NUTS, STEEL, CASTELLATED AND COLD PRESSED
Morrow Screw & Nut Co., Ltd., John, Ingersoll.
Williams & Co., J. H., Brooklyn, N.Y.
NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
NUT BURRING MACHINES
National Machy. Co., Tiffin, Ohio.
NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.
NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.
NUT TAPPERS
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.
OIL SEPARATORS
Can. Fairbanks-Morse, Co., Montreal.
Sheldon's, Ltd., Galt, Ont.
OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.
OIL STONE GRINDERS
Oliver Machinery Co., Grand Rapids, Mich.
OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.
OPENING DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.
OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto
OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford, Ont.
OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
OVENS FOR DRYING, TEMPER AND ANNEALING TRUCKS
OXYGEN, ELECTROLYTIC CELLS
Welding & Supplies Co., Montreal, Que.
Brantford Oven & Rack Co., Brantford, Ont.
OXY-ACETYLENE WELDING AND CUTTING
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.
OXY-ACETYLENE WELDING AND CUTTING PLANT
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Turner Brass Works, Sycamore, Ill.
PACKINGS, ASBESTOS
Cleveland Wire Spring Co., Cleveland.
PACKINGS, LEATHER, HYDRAULICS, ETC.
Baxter & Co., Ltd., J. R., Montreal, Que.
Graton & Knight Mfg. Co., Worcester, Mass.
William R. Perrin, Ltd., Toronto.
PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.
PAPER MILL CONVEYORS AND DRIVES
Can. Link-Belt Co., Toronto, Ont.
Bertrams, Ltd., Edinburgh, Scotland.
MacKinnon Steel Co., Sherbrooke, Que.
PARTITIONS, WIRE
Page Steel & Wire Co., Adrian, Mich.
PAPER MILL MACHINERY
Garlock-Walker Machinery Co., Toronto, Ont.
PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machinery Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.
PATTERN MAKERS' LATHES
Oliver Machinery Co., Grand Rapids, Mich.
PATTERN MAKERS' VISES
Oliver Machinery Co., Grand Rapids, Mich.
PATTERN SHOP SUPPLIES
Oliver Machinery Co., Grand Rapids, Mich.
PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.
PEDESTALS WITH DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.
PECK CARRIERS FOR POWER PLANTS
Can Link-Belt Co., Toronto, Ont.
PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.
PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.
PINS, TAPER
John Morrow Screw & Nut Co., Ingersoll, Ont.
PINS, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.
PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph, Ont.
PIPE CUTTING AND THREADING MACHINES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.
PHOTOSTATS
Commercial Camera Co., Providence, R.I.
PIPE RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.
PIERCING
Oliver Machinery Co., Grand Rapids, Mich.
PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE REAMERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE STOCKS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE THREADERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
PISTON RODS, ROUGH TURNED
General Steel Co., Milwaukee, Wis.
PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.
PLANER BOLTS
John Morrow Screw & Nut Co., Ingersoll, Ont.
PLANER JACKS
Armstrong Bros. Tool Co., Chicago.
PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Oliver Machinery Co., Grand Rapids, Mich.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardiner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.
PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.
PLANER-SHAPER, COMBINED OPEN SIDE
Lynd-Farquhar Co., Boston.
Williams & Wilson, Limited, Montreal, Que.
POWER HAMMERS
Quickwork Co., St. Marys, Ohio.
POWER TRANSMISSION MACHINERY
Williams & Wilson, Limited, Montreal, Que.
PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
PLIERS
Aikenhead Hardware Co., Toronto.
Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.
POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Quebec.
POLISHING MACHINES
Ford Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.
POLISHING PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.
POWER HOUSE CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
PRESSED STEEL PARTS
The Gray Ball Bearing Co., Ltd., Toronto.
PRESSERS, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.
PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.
PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.
PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
PRESSES, FILTER
William R. Perrin, Ltd., Toronto.
Smalley-General Co., Inc., Bay City, Mich.
PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.
PRESSES, HYDRAULIC
John Bertram & Sons Co., Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
PRESSES, BALING
William R. Perrin, Ltd., Toronto.
PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.



Mechanical Engineering Co., Ltd.

Room 308, Bank of Toronto Bldg., Montreal

Three Rivers, Que., Canada

Any Size

Illustration shows a Plate Heating Furnace installed in the plant of Canadian Vickers Ltd., Montreal.

Your proposition, if out of the ordinary, would be bettered by our co-operation. Get in touch with us.

GENUINE EMERY

Sizes 180, 160, 140, 120, 110, 100, 90, 80, 70, 60, 54, 46 40, 36, 30, 24, 20, 18, 16, 14, 12, 10, 9, 8. hole.

EMERY FLOUR AND WASHED FLOUR

EMERY GLASS FLINT GARNET CORUNDUM CARBORUNDUM	PAPER AND CLOTH	IN SHEETS, ROLLS, DISCS, BANDS, STRIPS and TAPES, &c.

John Oakey & Sons

LIMITED

WELLINGTON MILLS

LONDON, S. E. 1., ENGLAND

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.

Cutting Tool Furnace

For

Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting

Furnaces built for special requirements

Standard Fuel Engineering Co.

1646 Woodward Ave. Detroit, Michigan

STANDARD FUEL ENGINEERING CO. DETROIT, MICH.

Garlock-Walker Machinery Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, SCREW
Barnes, W. F., & John Co., Rockford, Ill.
Bliss Co., E. W., Brooklyn, N.Y.
William R. Perrin, Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRODUCTION WORK
Windsor Mach. & Tool Co., Windsor, Ont.

PROPELLERS
Kennedy & Sons, Wm., Owen Sound, Ont.

PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
Algoma Steel Corp., Sault Ste. Marie, Ont.
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Positive Clutch & Pulley Works, Ltd., Toronto.
J. C. Wilson & Co., Belleville, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, STEEL SASH, STEEL BELT
American Pulley Co., Philadelphia, Pa.

PULLEYS, FRICTION CLUTCH
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn
Williams & Wilson, Limited, Montreal, Que.

PULLEYS, BELT
American Pulley Co., Philadelphia, Pa.

PULP MILL MACHINERY
MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, CENTRIFUGAL
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

PUMPS, FUEL OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED
Darling Bros., Ltd., Montreal, Quebec.

PUMPS, HIGH PRESSURE
William R. Perrin, Ltd., Toronto.

PUMPS, ALL KINDS
Darling Bros., Ltd., Montreal, Quebec.
William R. Perrin, Ltd., Toronto.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, HYDRAULIC
Garlock-Walker Machinery Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

PUMPS, LUBRICATING, OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, HAND, FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, POWER FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, KEROSENE, OIL, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, ROTARY, POWER DRIVEN
Bowser & Co., Inc., S. F., Toronto, Ont.
Darling Bros., Ltd., Montreal, Quebec.
Trahern Pump Co., Rockford, Ill.
Williams & Wilson, Limited, Montreal, Que.

PUMPS, LUBRICANT, OIL, WATER
Darling Bros., Ltd., Montreal, Quebec.
Fry's (London), Ltd., London, England.
Trahern Pump Co., Rockford, Ill.

PUMPS, MOTOR AND BELT DRIVEN
Darling Bros., Ltd., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, STEAM AND CENTRIFUGAL
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

PUMPS, SUD
Fry's (London), Ltd., London, England.

PUMP LEATHERS
Graton & Knight Mfg. Co., Worcester, Mass.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co. Brooklyn, N.Y.
Boker & Co., Inc., H., Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Can Fairbanks-Morse Co., Montreal.
Gardner, Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Mulliner-Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Limited, Montreal, Que.

PUNCHES, HAND
Peck, Stow & Wilcox Co., Southington, Conn.

PUNCHES, POWER
John Bertram & Sons Co., Dundas, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Long & Allstatler, Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Stoll Co., D. H., Buffalo, N.Y.
Wickes & Co., Saginaw, Mich.
Williams & Wilson, Limited, Montreal, Que.

PUNCHES, CHROME, VANADIUM SHELL
Hammond Steel Co., Inc., Syracuse, N.Y.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

PYROMETERS
Bristol Co., Waterbury, Conn., U.S.A.
Shore Instrument & Mfg. Co., New York City
Taylor Instrument Co., Rochester, N.Y.

QUARTERING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS
United Brass & Lead, Ltd., Toronto, Ont.

RAIL BENDERS
Algoma Steel Corp., Sault Ste. Marie, Ont.
Niles-Bement-Pond Co., New York.

RADIAL DRILLING MACHINE, WALL
Lynd-Farquhar Co., Boston.
Wickes & Co., Saginaw, Mich.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

RAIL OVERHEAD
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

RASPS
Morrow Screw & Nut Co., John, Ingersoll, Ont.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Greenfield Tap & Die Corp., Greenfield, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER AND SELF-FEEDING
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

REAMERS, CHUCKING
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, TAPER, BRIDGE
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, JOBBERS
John Morrow Screw & Nut Co., Ingersoll, Ont.

REAMERS, PIPE, SHELL
Greenfield Tap & Die Corp., Greenfield, Mass.
John Morrow Screw & Nut Co., Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REELS, WIRE AND TEXTILE MFG.
American Pulley Co., Philadelphia, Pa.

REGULATORS, AUTOMATIC
Electric Steels & Metals, Ltd., Welland, Ont.

REGULATORS, PRESSURE TEMPERATURE
Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn
High-Speed Hammer Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.
F. B. Shuster Co., New Haven, Conn.

ROAD BUILDING EQUIPMENT
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

RODS, ROPE AND SPRING
General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich.

RODS, PURE NICKEL, MONEL METAL, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

ROLLER CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Limited, Montreal, Que.

ROPE, GALX, MONEL METAL, BRONZE
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

ROPE, TILLER AND SASH CORD
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

ROTARY SHEARS
The Quickwork Co., St. Mary's, Ohio.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

RULES, STEEL, STRAIGHT AND FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

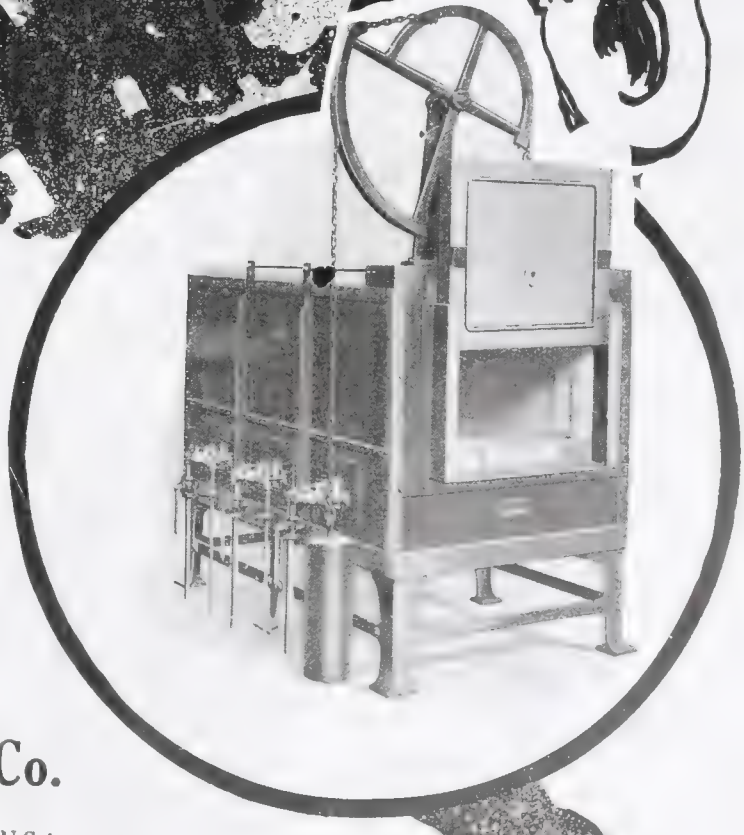
RULES, BOXWOOD, FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOARD AND LONG
Lufkin Rule Co. of Can., Windsor, Ont

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto, Ont
Williams & Wilson, Limited, Montreal, Que

SAFETY DEVICES
Strong, Kennard & Nutt Co., Cleveland, Ohio

-And I Always Thought That Was A Good Tractor-



Some little part gave way and his Spring plowing was delayed for a couple of days. His good opinion of your tractor is gone forever; others will hear his tale and your distributor in that territory will fall two or three short of selling as many of your tractors as he would have sold if it hadn't been for that defective part, defective because it was improperly heat-treated.

It makes no difference whether you manufacture tractors or other machines or machine parts, unless you have the **right** heat-treating furnace the reputation of your product is in constant jeopardy.

You Cannot Afford to Take Such Chances

GILBERT & BARKER Heat-Treating Furnaces

insure uniform high quality of produce because they are designed right and built right. The combustion in a G. & R. Furnace is 100% efficient, temperature control is one of the big features, the heat is uniform **always**, the result is a finished product of maximum tensile strength which will stand up under the hardest usage.

The operating cost of G. & B. Furnaces is extremely low.

Send for Bulletin 24. Let our Engineers suggest the furnace that is best suited to your requirements.

To-day is a better day than to-morrow—write.

Gilbert & Barker Mfg. Co.

Established 1865

SPRINGFIELD, MASS., U.S.A.

New York Office: 26 Broadway

Canadian Agents:

Williams & Wilson, Limited, Montreal, Que.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

SAND BLAST MACHINES
Pangborn Corporation, Hagerstown, Md.

SAND BLAST SUPPLIES AND ACCESSORIES
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
Pangborn Corporation, Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANITARY DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SASH SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

SAWS, CIRCULAR METAL
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAW SHARPENERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

SAWS, SLITTING
Taylor, J. A. M., Stair Bldg., Toronto, Ont.

SCALES, MECHANICS'
Luffvin Rule Co. of Can., Windsor, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCREENING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

SCREW MACHINE PRODUCTS
Galt Machine Screw Co., Galt, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
United Brass & Lead, Ltd., Toronto.

SCREW MACHINES, HAND, AUTOMATIC
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
H. C. Dodge, Inc., Boston, Mass.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que.

SCREW MACHINES, AUTOMATIC MULTIPLE SPINDLE
H. C. Dodge, Inc., Boston, Mass.
National Acme Co., Cleveland, Ohio.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

SCREWS, COLLAR
John Morrow Screw & Nut Co., Ingersoll, Ont.

SCREW COLLARS
Morrow Screw & Nut Co., Ltd., John, Ingersoll.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 308 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SCREW SLOTTERS
Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

SCREWS, THUMB AND NUT
Morrow Screw & Nut Co., John, Ingersoll, Ont.

SCREWS, SET, MILLED AND HEADLESS
Morrow Screw & Nut Co., John, Ingersoll, Ont.

SCREWS, MACHINE, CAP AND SPECIAL
Morrow Screw & Nut Co., John, Ingersoll, Ont.

SCREWS SAFETY, SET AND HOLLOW SET
Morrow Screw & Nut Co., John, Ingersoll, Ont.

SCREWS, FLAT AND COUNTERSUNK
Morrow Screw & Nut Co., John, Ingersoll, Ont.

SCREWS, WRENCH, BENCH AND STOOL
Morrow Screw & Nut Co., John, Ingersoll Ont.

SECOND-HAND MACHINERY
The Geo. E. Foss Mchy. & Supply Co., Montreal.
Williams & Wilson, Limited, Montreal, Que.

SEPARATORS, MOISTENERS AND OIL FOR COMPRESSED AIR
Pangborn Corporation, Hagerstown, Md.

SELF-OPENING DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

SEPARATORS, SAND
Pangborn Corporation, Hagerstown, Md.

SET SCREWS, HOLLOW HEADED
John Morrow Screw & Nut Co., Ingersoll, Ont.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Bristol Co., Waterbury, Conn., U.S.A.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. E. Foss Mchy. & Supply Co., Montreal
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Rhodes Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.

SHAFTING
Algoma Steel Corp., Sault Ste. Marie, Ont.
Can Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Jones & Glassco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

SHARPENING STONES
Norton Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas
Bertrams, Ltd., Edinburgh, Scotland
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

SHEARS, POWER
John Bertram & Sons Co., Dundas
Bliss, E. W., Co., Brooklyn, N.Y.
Brown Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Long & Allstatter, Hamilton, Ohio.
Wickes & Co., Saginaw, Mich.
A. B. Jardine & Co., Limited, Hespeler, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

SHEARS, ROTARY
The Quickwork Co., St. Mary's, Ohio.

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.

SHEET METAL ROLLING MACHINES
Peck, Stow & Wilcox Co., Southington, Conn.

SHEETS, NICKEL, RESIST, ALLOY
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

SHEARS, PLATE CUTTING, SLITTING
The Quickwork Co., St. Mary's, Ohio.

SHEARS, SPLITTING
Peck, Stow & Wilcox Co., Southington, Conn.

SHEARS, IRREGULAR AND CIRCLE CUTTING
The Quickwork Co., St. Mary's, Ohio.
Stoll Co., Inc., The D. H., Buffalo, N.Y.

SHEET METAL MACHINERY
Peck, Stow & Wilcox Co., Southington, Conn.

SHEARS, SERPENTINE
The Quickwork Co., St. Mary's, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

SHEETS, CRUCIBLE, CAST
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

STAMPING
Canadian Cartridge Co., Ltd., Hamilton, Ont.

SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont

SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.

SHELVING, STEEL
Dennis Wire & Iron Works, London, Ontario.

SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn
High Speed Hammer Co., Rochester, N.Y.

SHIPYARD MACHINERY

SHOP FURNITURE
Dennis Wire & Iron Works, London, Ontario.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal
Williams & Co., J. H., Brooklyn, N.Y.

SILENT CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilkinson & Kompass, Hamilton, Ont

SLEDGES, CAST IRON
Katie Foundry, Galt, Ont.

SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert Niagara Falls, Ont.

SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.

SMOKESTACKS
Canadian Welding Works, Montreal, Que
MacKinnon Steel Co., Sherbrooke, Quebec.

SNIPS, TINNERS AND SHEET METAL WORKERS'
Kearney & Trecker Co., Milwaukee, Wis
Morrow Screw & Nut Co., John, Ingersoll, Ont.

SOCKET HEAD CAP SCREWS

SOCKETS AND SLEEVES
John Morrow Screw & Nut Co., Ingersoll, Ont.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford Mass.
Rice, Lewis & Son, Toronto, Ont.

SOIL PIPE FITTINGS, CAST IRON
Katie Foundry, Galt, Ont.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto

SOLDER
Aikenhead Hardware Co., Toronto Ont.
Canada Metal Co., Ltd., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton
United Brass & Lead, Ltd., Toronto

SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SPLICING CLAMPS
Peck, Stow & Wilcox Co., Southington, Conn.

SPRINGS, MACHINERY
Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Dunbar Bros. Co., Bristol, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.

SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn
Banfield, W. H., & Sons, Toronto.
Beaver Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Elliott & Whitehall Mach & Tool Co., Galt, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont
Katie Foundry Galt, Ont.
National-Acme Co., Cleveland, Ohio
Mulliner & Edlund Tool Co., Syracuse N.Y
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co, Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont.
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS, SPIRAL, TOOL
The Dunbar Brothers Co., Bristol, Conn.

SPROCKETS, COMPENSATING
Morse Chain Co., Ithaca, New York.

SPROCKETS, SPRING
Morse Chain Co., Ithaca, New York.

SPROCKETS, CHAIN
Can Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa
Wilson & Co., J. C., Belleville, Ont.

SPRINGS FOR TOYS AND ELECTRIC DEVICES
The Dunbar Brothers Co., Bristol, Conn.

SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CHILLED THREAD
Katie Foundry, Galt, Ont.

SQUARES
Peck, Stow & Wilcox Co., Southington, Conn.

Why Did We Let Trotzky Go?

THERE was a time when Canada had it in her power to end the war. In the early days of the Russian Revolution a bushy-haired German was taken off a boat at Halifax and interned at Amherst, N.S. He pretended to be a Russian but was known to be in German pay—on his way to push the revolution—British and American Intelligence Officers so informed our authorities. But pressure was brought to bear and the man was finally released. He got to Europe and became the most sinister figure among the Bolsheviki. Largely as a result of his work, Russia dropped out of the war and Germany was able to fight on for eighteen months. That man was Leon Trotzky. His real name was Braunstein.

Why was Trotzky allowed to leave Canada?

Colonel MacLean discusses this question in the June issue of MACLEAN'S MAGAZINE. He tells the story of Trotzky's activities, of his arrest and subsequent release in full detail, tracing the threads of a strange intrigue from Germany to Washington, and Washington to Ottawa. It is a gripping story, the most important inside story of the war.

Other National Features of This Issue

"Victory Stuff" By Robert W. Service.

"Solving the Problem of the Arctic" By Vilhjalmur Stefansson.

"The Gold Wolf" By W. A. Fraser.

"Hobson's Hard Start" By William Byron.

"The Menace in the South" By Agnes C. Laut.

"The Undercurrents" By J. K. Munro.

And a score of other interesting articles.

Secure YOUR Copy EARLY--While Supply Last

Over a Quarter of a Million Canadians Will Read

MACLEAN'S

"CANADA'S NATIONAL MAGAZINE"

20c. — June — 20c.

ON SALE AT ALL NEWSDEALERS

SAFETY CYLINDERS
Oliver Machinery Co., Grand Rapids, Mich.
SAW BENCHES
Oliver Machinery Co., Grand Rapids, Mich.
SAWS SWING
Oliver Machinery Co., Grand Rapids, Mich.
STAYBOLT TOPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
STAIRS, IRON
Canada Wire & Iron Goods Co., Hamilton, Ont.
SANDERS
Oliver Machinery Co., Grand Rapids, Mich.
SAW GUARDS
Oliver Machinery Co., Grand Rapids, Mich.
STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.
Hope & Sons, Henry, of Canada, Peterboro, Ont.
Homer & Wilson, Hamilton, Ont.
STAMPINGS, METAL
STAMPINGS, METAL AND STEEL
Can. Cartridge Co., Hamilton, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.
STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.
SAFETY CYLINDERS
Oliver Machinery Co., Grand Rapids, Mich.
STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.
STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec.
SPEED LATHES
Oliver Machinery Co., Grand Rapids, Mich.
STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
STEEL BALLS
Rochester Ball Bearing Co., Rochester, N.Y.
STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y.
Illingworth Steel Co., John, New York, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.
SURFACES
Oliver Machinery Co., Grand Rapids, Mich.
STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Electric Steel & Metals Co., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.
Swedish Crucible Steel Co., Windsor, Ont.
STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal
Union Drawn Steel Co., Hamilton, Ont.
STEEL, PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STEEL, HIGH SPEED
Armstrong, Whitworth of Canada, Ltd., Montreal
Wm. Atkins & Co., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Ltd., Montreal.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall, Son & Bunney, Toronto, Ont.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa., represented in Canada by Norton, Callard & Co., Montreal, Que.
STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.
STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.
STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.
STELLITE, HIGH-SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.
STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.
STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que.
Drury, H. A., Co., Montreal, Que.
Wells Bros. of Can., Galt, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.
STRAND
Page Steel & Wire Co., Adrian, Mich.
SYSTEMS, REMOTE CONTROL FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
STORAGE AND HANDLING SYSTEMS FOR DRY CLEANERS, AND NAPHTHA
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, RECLAIMING, FOR OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, RAILWAY OIL, STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, PAINT, OIL STORAGE AND HANDLING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SYSTEMS, OIL STORAGE AND DISTRIBUTING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.
TABLES, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.
TACK (DOUBLE POINT) MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.
TAPPING MACHINES (PENUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto
TANKS, GASOLINE, KEROSENE AND OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec
Dominion Forge & Stamping Co., Walkerville
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
TANKS, LUBRICATING OIL STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANKS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANKS, STEEL, WATER PRESSURE
Bowser & Co., Inc., S. F., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec
MacGregor & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.
TANKS, UNDERGROUND STORAGE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.
TANKS, WHEEL, FOR LUBRICATING OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
TANKS
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.
TAPPING MACHINES AND ATTACHMENTS
Bertram, John, & Sons Co., Dundas
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York
The Geometric Tool Co., New Haven
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit
Niles-Bement-Pond Co., New York
Rickert-Shafer Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal, Que.
TAPES—MEASURING, STEEL AND WOVEN
Lufkin Rule Co. of Can., Windsor, Ont.
TAPES, POCKET
Lufkin Rule Co. of Can., Windsor, Ont.
TAPS, ADJUSTABLE
Baxter Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.
TAPS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
TAPS, GUN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass
Wells Bros. of Can., Galt, Ont.
TAPS, STAYBOLT, "MAX" TAP
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, TAPPER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
TAPS, DIES AND WRENCHES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont
Williams & Wilson, Limited, Montreal, Que.
TAP EXTRACTORS
Walton Co., The, Hartford, Conn.
THERMOMETERS, INDUSTRIAL
Taylor Instrument Co., Rochester, N.Y.
THERMOMETERS, ENGRAVED
Taylor Instrument Co., Rochester, N.Y.
THERMOMETERS, TEMPERATURE AND PRESSURE
Taylor Instrument Co., Rochester, N.Y.
THERMOMETERS, RECORDING AND INDEX
Bristol Co., Waterbury, Conn., U.S.A.
Taylor Instrument Co., Rochester, N.Y.
TESTING INSTRUMENTS METALLURGICAL
Shore Instrument & Mfg. Co., New York City
TENOVERS
Oliver Machinery Co., Grand Rapids, Mich.
TESTING LABORATORIES
Toronto Testing Laboratory, Toronto.
THREAD-CUTTING MACHINES
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont
Williams & Wilson, Limited, Montreal, Que.
THREADING TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
THREADING MACHINES FOR BOLTS, NUTS AND PIPES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.
THREAD MILLING MACHINES
Taft-Pierce Mfg. Co., New York, N.Y.
The Gray Ball Bearing Co., Ltd., Toronto.
Smalley-General Co., Inc., Bay City, Mich.
THUMB SCREWS AND NUTS
Canada Found'n & Forgings Ltd., Welland, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
United Brass & Lead Ltd., Toronto
Williams & Co., J. H., Brooklyn, N.Y.
TINSMITHS' TOOLS
Brown, Boggs & Co., Hamilton, Can.
Williams & Wilson, Limited, Montreal, Que.
TIRE BENDERS
A. B. Jardine & Co., Limited, Hespeler, Ont
TIRE SETTING MACHINES, HYDRAULIC
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
TOOL CASES
Rice, Lewis & Son, Toronto, Ont.
TOOL HOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Armstrong Bros. Tool Co., Chicago.
Deloro Smelting & Refining Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
TOOL POSTS, LATHE
Armstrong Bros. Tool Co., Chicago.
Williams & Co., J. H., Brooklyn, N.Y.
TOOL ROOM PARTITIONS
Canada Wire & Iron Goods Co., Hamilton.

TOOL STEEL
Armstrong, Whitworth, Ltd. of Canada, Montreal
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Wm. Atkins & Co., Sheffield, Eng.
General Steel Co., Milwaukee, Wis.
H. A. Drury Co. Mon
Firth & Sons, Thos., Montreal Q
Hammond Steel Co., Inc., Syracuse, N Y
Harvey & Co., Arthur C., Boston, Mass.
Hawkridge Bros Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto, Ont.
Norton, Ralph B., Agent, Montreal.
Latrobe Electric Steel Co., Latrobe, Pa.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

TOOLS, BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

TOOLS, BLACKSMITHS'
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.

TOOLS, ADJUSTABLE BORING
The Kelly Reamer Co., Cleveland, O.
Williams & Wilson, Limited, Montreal, Que.

TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago, Ill
A. R. Williams Machinery Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
United States Elec. Tool Co., Cincinnati, O.

TOOLS, FORMING
Davidson Tool Mfg. Co., New York, N Y.

TOOLS, PNEUMATIC
Can. Ingersoll Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machinery Co., St. Louis Mo
Garlock-Walker Machinery Co., Toronto, Ont
Independent Pneumatic Tool Co., Chicago, Ill

TOOLS, LATHE, PLANER, SLOTTER
Armstrong Bros. Tool Co., Chicago
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y.

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind

TORCHES, STEEL
Armstrong, Whitworth of Canada, Ltd., Montreal
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

TORCHES, GASOLINE, KEROSENE AND ALCOHOL
Turner Brass Works, Sycamore, Ill

TRACK, PORTABLE STEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

TRANSFORMERS
MacGovern & Co., Montreal, Que.

TRANSMISSION CHAIN
Morse Chain Co., Ithaca, New York.

TRANSMISSION MACHINERY
American Pulley Co., Philadelphia, Pa.
A. R. Williams Machinery Co., Toronto.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto
Jones & Glassco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N Y
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que

TRANSMISSION ROPE
Jones & Glassco, Montreal, Que
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Wilson & Co., J. C., Belleville, Ont.

TRANSMISSION TOWERS
Curtis Pneumatic Machinery Co., St. Louis Mo
Dominion Bridge Co., Montreal, Quebec
MacKinnon Steel Co., Sherbrooke, Quebec.
Northern Crane Works, Walkerville
Tallman Brass & Metal Co., Hamilton

TRANSVEYORS
Cowan Truck Co., Holyoke, Mass.

TROLLEYS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

TRUCKS, FACTORY, FREIGHT, ETC.
Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing Co., Toronto
Cowan Truck Co., Holyoke, Mass.
MacKinnon Steel Co., Sherbrooke, Quebec.
Rice, Lewis & Son, Toronto, Ont.

TRUCKS, LUMBER AND KILN
Sheldons, Ltd., Galt, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS & COPPER
Standard Tube & Fence Co., Woodstock, Ont.
Tallman Brass and Metal Co., Hamilton, Ont.

TUBING COILERS, FLEXIBLE METAL
Almond Mfg. Co., T. R., Ashburnham, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.

TURRET MACHINES, LATHES
Brown & Sharpe Mfg. Co., Providence
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Tap & Die Corp., Greenfield, Mass.
Oliver Machinery Co., Grand Rapids, Mich.
Pratt & Whitney Hartford, Conn.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

TUNGSTEN FILAMENT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.

TURBO GENERATOR UNITS
MacGovern & Co., Montreal, Que.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.

TURNBUCKLES
Canada Foundries & Forgings, Ltd. Welland Ont
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Rice, Lewis & Son, Toronto, Ont.

TURNTABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

UPSETTING AND BENDING MACHINERY
John Bertram & Sons Co., Dundas
Brown, Boggs Co., Ltd., Hamilton, Canada
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto
Williams & Wilson, Ltd., Montreal, Que
Williams & Wilson, Limited, Montreal, Que.

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.

VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.

VENTILATING APPARATUS
Brantford Oven & Rack Co., Brantford, Ont.
Can. Blower & Forge Co., Kitchener, Ont
Sheldons, Limited, Galt, Ont.
A. R. Williams Machy. Co., Toronto
Williams & Wilson, Limited, Montreal, Que.

VISE STANDS, PORTABLE
Williams & Co., J. H., Brooklyn, N.Y.

VISES, BENCH
Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass
The Geo. F. Foss Mchy. & Supply Co Montreal
Williams & Wilson, Limited, Montreal, Que.

VISES, PIPE
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que
Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

VISES, PLANER AND SHAPER
Aikenhead Hardware Co., Toronto, Ont
Skinner Chuck Co., New Britain, Conn
Williams & Wilson, Limited, Montreal, Que.

WASHER MACHINES
National Machy. Co., Tiffin, Ohio

WASHERS
Barnes, Wallace, Co., Bristol, Conn.
Graton & Knight Mfg. Co., Worcester, Mass
Kayser-Ellison & Co., Ltd., Montreal.
Morrow Screw & Nut Co., Ltd., John, Ingersoll
Norton, Ralph B., Agent, Montreal.
London Bolt & Hinge Works, London Ont
Steel Co. of Canada, Ltd., Hamilton, Ont.

WASTE
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wood Turret Machine Co., Brazil, Ind

WATER-INTAKE SCREENS
Can. Link-Belt Co., Toronto, Ont.

WATER TOWERS
Toronto Iron Works, Ltd., Toronto.

WELDING, WIRE
Page Steel & Wire Co., Adrian, Mich

WELDING, ELECTRIC, SPOT, BUTT, ETC.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

WELDING MASKS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

WELDERS, ELECTRIC, SPOT, BUTT, ETC.
Tabor Mfg. Co., Philadelphia, Pa.

WELDING GOGGLES
Strong, Kennard & Nutt Co., Cleveland, Ohio

WELDING RODS AND WIRE
Page Steel & Wire Co., Adrian, Mich.
Welding & Supplies Co., Montreal, Que.

WHEELS, SPROCKET AND TRACTION
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

WHEELS, PRESSED STEEL
American Pulley Co., Philadelphia, Pa.

WHEEL TRUEING TOOLS
Anderson & Co., of Canada, Geo., Montreal, Que
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal, Que.

WINCHES
Can. Ingersoll-Rand Co., Sherbrooke, Que.
John H. Hall & Sons, Brantford.
Kennedy & Son, Wm., Owen Sound, Ont
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

WIRE, CAST STEEL AND MUSIC
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

WIRE COILING AND POINTING MACHINERY
Baird Machine Co., Bridgeport, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass

WIRING MACHINES
Quickwork Co., St. Marys, Ohio.

WRENCHES, PIPE, POWER
Peck, Stow & Wilcox Co., Southington, Conn.

WROUGHT IRON PIPE BENDS
James Ballantyne, Montreal.

WIRE RAILS
Sleeper & Hartley, Inc., Worcester Mass.

WIRE CLOTH AND PERFORATED METALS
Canada Wire & Iron Goods Co., Hamilton
Page Steel & Wire Co., New York, N.Y.

WIRE FENCING

WIRE, COPPER, CLAD STEEL

WIRE, LINK FABRIC
Page Steel & Wire Co., Adrian, Mich

WIRE FORMING AND STAMPING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada
F. B. Shuster Co., New Haven, Conn

WIRE NAILS
Gilliam Nail Works operated by Canada Metal Co., Ltd., Toronto.
Page Steel & Wire Co., New York, N Y
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont

WIRE NAIL MACHINERY
National Machy. Co., Tiffin, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Page Steel & Wire Co., New York, N Y

WIRE, SPARK PLUG, MANGANESE

NICKEL, COPPER NICKEL, MONEL METAL
Can. Driver-Harris Co., Ltd., Walkerville, Ont.

WIRE SPRING
Page Steel & Wire Co., Adrian, Mich.

WIRE STEEL, BRASS, COPPER,
Page Steel & Wire Co., New York
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE, TELEPHONE, TELEGRAPH, GALVANIZED AND ELECTRICAL
Page Steel & Wire Co., Adrian, Mich

WIRE, WEAVING, MONEL METAL, BRASS COPPER, GOLDEN BRONZE, HIGH BRASS, LOW BRASS, NICKEL
Canadian Driver Harris Co., Limited, Walkerville, Ont.

WOOD BORING MACHINES
Canada Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que

WIRE STRAIGHTENERS AND CUTTERS
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada
F. B. Shuster Co., New Haven, Conn
Sleeper & Hartley, Inc., Worcester, Mass

WOODWORKING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co Toronto Ont.
Oliver Machinery Co., Grand Rapids, Mich
Silver Mfg. Co., Salem, Ohio
A. R. Williams Machy. Co Toronto
Williams & Wilson, Ltd., Montreal, Que

WOOD TRIMMERS
Oliver Machinery Co., Grand Rapids, Mich.

WOOD LATHES
Oliver Machinery Co., Grand Rapids, Mich.

WOOD MILLING MACHINES
Oliver Machinery Co., Grand Rapids, Mich

WOOD SHAPERS
Oliver Machinery Co., Grand Rapids, Mich.

WRENCHES
Williams & Co., J. H., Brooklyn, N.Y.
Armstrong Bros. Tool Co., Chicago, Ill.
Butterfield & Co., Rock Island, Que.
Canada Foundries & Forgings, Ltd., Welland, Ont
Keystone Mfg. Co., Buffalo, N.Y.
Wells Bros. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co St Catharines, Ont

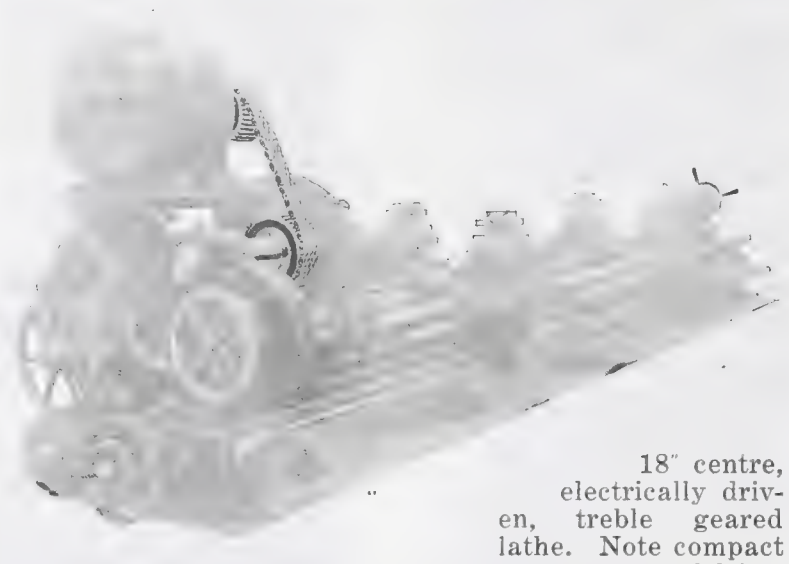
WOVEN STEEL PARTITIONS
Page Steel & Wire Co., Adrian, Mich.

WRENCHES, AUTOMOBILE NARROW JAW, MONKEY AND SCREW
Bemis & Call Hdwe. & Tool Co., Springfield, Mass
Morrow Screw & Nut Co., Ltd., John, Ingersoll
Whitman & Barnes Mfg. Co St Catharines Ont

WRENCHES, PIPE, MONKEY, TAP AND POWER
Aikenhead Hardware Co., Toronto, Ont.
Bemis & Call Hdwe. & Tool Co., Springfield, Mass
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.
Wells Bros. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Williams & Co., J. H., Brooklyn, N.Y.
Bemis & Call Hdwe. & Tool Co., Springfield, Mass
Keystone Mfg. Co., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

WRENCHES, SOCKET
Sleeper & Hartley, Inc., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

"THE COVENTRY" CHAINS



18" centre, electrically driven, treble geared lathe. Note compact arrangement of drive.

THE REASONS FOR
CHAIN TRANSMISSION

Will work at a high speed and in either direction. Positive, yet flexible, turning movement. Will work on centres too long for gears and too short for belts, so that drive can be arranged to suit either details of design.

Unaffected by heat or cold — give positive velocity ratio, — minimize journal friction. Will transmit considerable power with high efficiency, which is retained. Increase output, give uniform quality of product, consume minimum of power. Minimum attention required for repairs or adjustment.

The Coventry Chain Company, Limited, Coventry, England

Cables: CHAINS, COVENTRY. Codes: A.B.C., 3rd and 4th Editions
WESTERN UNION and MARCONI

Measuring Tapes, Steel Rules, Straight Edges, Surveyors' Band Chains, Engineers' Tools

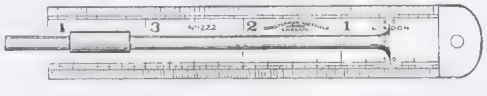
MANUFACTURED BY

JAMES CHESTERMAN & CO., Limited

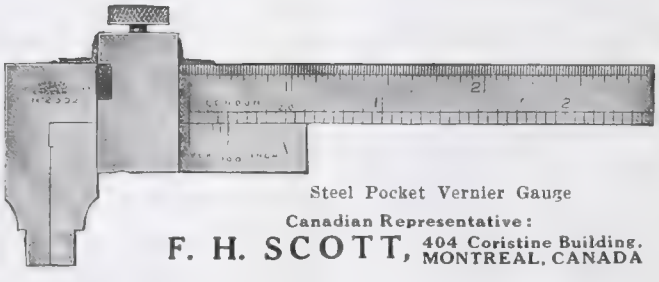
SHEFFIELD, · ENGLAND

Wind-up Measures, Steel, Linen and Metallic. With Improved Patent Flush Handle.

Chesterman tools are the highest standard of accuracy in the British Empire, and the quality of steel and substantial build guarantee a maximum of service and economy.



Steel Depth Gauge



Steel Pocket Vernier Gauge

Canadian Representative:
F. H. SCOTT, 404 Coristine Building, MONTREAL, CANADA

Mention this paper when writing to Advertisers

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI. TORONTO, JUNE 19, 1919 No. 25

EDITORIAL CONTENTS

HAD EIGHT-HOUR WORKING DAY TWENTY YEARS AGO 625
METHODS OF MILLING AND BORING YOKE AND CAP 630
THE ELECTRIC FURNACE AND THE NON-FERROUS METALS 632
SHOP ARITHMETIC—CUBE ROOT AND MENSURATION 635
WHAT OUR READERS THINK AND DO 638
DEVELOPMENT IN SHOP EQUIPMENT 640
EDITORIAL 642
MARKET DEVELOPMENTS 644
SELECTED MARKET QUOTATIONS 649
INDUSTRIAL DEVELOPMENTS 59

THE MACLEAN PUBLISHING COMPANY, LIMITED

JOHN BAYNE MACLEAN, Pres. H. T. HUNTER, Vice-pres. H. V. TYRRELL, Gen. Man.

Publishers of Hardware and Metal, The Financial Post, MacLean's Magazine, Farmers' Magazine, Canadian Grocer, Dry Goods Review, Men's Wear Review, Printer and Publisher, Bookseller and Stationer, Canadian Machinery and Manufacturing News, Power House, Sanitary Engineer, Canadian Foundryman, Marine Engineering of Canada, Canadian Motor, Tractor and Implement Trade Journal.

Cable Address: Macpubco, Toronto; Atabek, London, Eng.

ESTABLISHED 1887.

CANADIAN MACHINERY AND MANUFACTURING NEWS

A. R. KENNEDY, Managing Editor. B. G. NEWTON, Manager.
Associate Editors: J. H. RODGERS. W. F. SUTHERLAND, T. H. FENNER.
Eastern Canada Representative: F. L. Jennings; Ontario Representative: S. S. Moore; Toronto and Hamilton Representative; W. E. G. MacDonald.

CHIEF OFFICES:

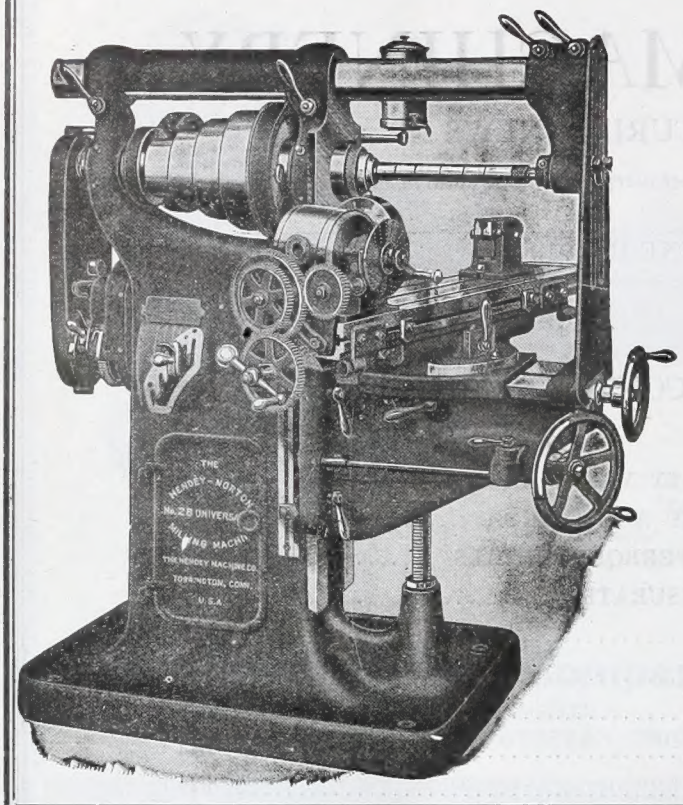
CANADA—Montreal, Southam Building, 128 Bleury Street, Telephone 1004: Toronto, 143-153 University Ave., Telephone Main 7324; Winnipeg, 1103 Union Trust Building, Telephone Main 3449; Vancouver, 39 Tenth Ave. W.

GREAT BRITAIN—LONDON, The MacLean Company of Great Britain, Limited, 88 Fleet Street, E.C., E. J. Dodd, Director. Telephone Central 12960. Cable address: Atabek, London, England.

UNITED STATES—New York, A. R. Lowe, Room 620, 111 Broadway, N.Y., Telephone Rector 8971; Boston, C. L. Morton, Room 734, Old South Building, Telephone Main 1204. A. H. Byrne, Room 1401, Lytton Bldg., 14 E. Jackson Street, Chicago, Telephone Harrison 9133.

SUBSCRIPTION PRICE—Canada, Great Britain, South Africa and the West Indies, $3.00 a year; United States $3.50 a year; other countries, $4.00 a year; Single Copies, 15 cents. Invariably in advance.

Anybody Can Operate This Miller



and Turn Out a Pile of Work so Simple to Operate is the

"HENDEY"

Skilled mechanics are scarce these days—but anyone can run a machine of its simplicity and turn out work accurately and fast without trouble.

All Feeds positive driven through gearings giving 18 changes.

This is the universal type—designed to handle all milling operations performed on machines of this character, either with regular equipment or by aid of attachments, which can be supplied for increasing efficiency and scope of machine.

Write for full description

The Hendey Machine Co.

Torrington, Conn., U.S.A.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

INDEX TO ADVERTISERS

A
Aikenhead Hardware Co. 61
Algoma Steel Corporation 4
Allentown Experimental Works 66
Almond Mfg. Co. 21
American Pulley Co. 96
Anderson, Geo. A. 9
Armstrong Bros. Tool Co. 93
Armstrong-Whitcomb Co. of Canada 13
Atkins & Co., Ltd., Wm. 16

B
Ballantyne, James 92
Baird Machine Co. 96
Banfield & Co., W. H. 72
Barnes, Wallace, Co. 65
Beaudry & Co., Inc. 95
Becker Milling Machine Co. 82
Bertram & Sons Co., John 1
Bertrams, Ltd. 64
Betts Machine Co. 5
Bicknell-Thomas Co. 21
Blount Co., J. G. 91
Brantford Oven & Rack Co. 64
Bridgeford Mach. & Tool Works.... 5
Bristol Company 92
Bristol Machine Tool Co. 76
Brockville Foundry Co. 94
Brown, Boggs Co. 11
Budden, Hanbury A. 65
Butterfield & Co., Inc. 105

C
Canada Foundries & Forgings, Ltd. 13
Canada Machinery Corporation .... Outside back cover
Canada Metal Co. 15
Can. Blower & Forge Co. 75
Can. Desmond-Stephan Co. 96
Can. Driver-Harris Co., Ltd. 74
Can. Fairbanks-Morse Co. 12
Can. Ingersoll-Rand Co. 6
Can. Link-Belt Co., Ltd. 15
Can. Steel Foundries 9
Carlyle Johnson Mach. Co. 8
Chapman Double Ball Bearing Co... 81
Chesterman, James 118
Chicago Flexible Shaft Co. 85
Cisco Machine Tool Co. 18
Classified Advertising 66
Cleveland Pneumatic Tool Co. 90
Consolidated Optical Co. 90
Consolidated Press Co. 87
Coventry Chain Co. 113
Cushman Chuck Co. 21

D
Darling Bros., Limited 93
Davidson, Thos. 54
Davis-Bournonville Co. 95
Dennis Wire & Iron Goods Co..... 81
Diamond Saw & Stamping Works.. 18
Dominion Foundries & Steel, Ltd. 84
Dunbar Bros. Co., The 89

E
Eastern Machine Screw Corp. 23
Electric Steel & Metals, Ltd. 6
Elliott & Whitehall 70

F
Fetherstonhaugh & Co. 65
Fitchburg Grinding Machine Co.... 71
Financial Post of Canada 79
Firth & Sons, Thos. 14
Ford-Smith Machine Co. 19
Forrest, Jackson & Forrest 94
Foss Mach. & Supply Co., Geo. F.. Inside back cover
Frost Mfg. Co. 92
Fry's (London), Ltd. 19

G
Garlock-Walker Machy. Co. 67
Garvin Machine Co. 75
General Steel Co. 8
Geometric Tool Co. 63
Giddings & Lewis Mfg. Co. 95
Gilbert & Barker Mfg. Co. 113
Gisholt Machine Co. 31
Gooley & Edlund 92
Grant Gear Works 94
Grant Mfg. & Machine Co. 87
Gray Ball Bearing Co. 84
Greenfield Machine Co. 93
Greenleafs, Ltd. 69

H
Hamilton Gear Co., Limited 78
Hanna & Co., M. A. 14
Harbison-Walker Refractory Co. 65
Hawkridge Bros. 64
Heald Machine Co. 25
Hendey Machine Co. 120
Hepburn, John T. 78
High Speed Hammer Co., Inc. 87
Hinckley Mach. Works 93
Hoefer Mfg. Co. 91
Hollander Machinery Co. 67
Homer & Wilson 70
Hope & Sons, Henry 71
Hoyt Metal Co. 16
Hunter Saw & Machine Co. 94
Hurlbut, Rogers Machinery Co..... 81

I
Independent Pneumatic Tool Co. ... 101
Indicating Calipers Co. 95
Ingersoll File Co. 59

J
Jacobs Mfg. Co. 22
Jardine & Co., A. B. 13
Johnson Machine Co., Carlyle 8
Johanson Inc., C. E. 73
Jones & Glassco 81
Joyce-Koebel Co. 71

K
Katie Foundry Co. 96
Kayser-Ellison & Co., Limited..... 12
Kennedy & Sons, William..... 83

L
Landis Machine Co. 95
Landers Tool Co. 101
Latrobe Electric Steel Co. 9
Lufkin Rule Co. 65
Lynd-Farquhar Co. 80

M
MacGovern & Co. 88
MacKinnon Steel Co. 9
MacLean's Magazine 115
Manitoba Steel Foundries, Ltd. 96
Marshalltown Mfg. Co. 83
Marten Machine Co. 68
Matheson & Co., I. 66
Matthews & Co., Jas. H. 33
McDougall Co., Ltd., R. 30
McFarlane Machy. Co., G. W. 66
McLaren Belting Co., J. C. 94
Mechanical Engineering Co. 111
Metalwood Mfg. Co. 26
Morrow Screw & Nut Co., Ltd., J. 24
Morse Chain Co. 90
Morse Twist Drill Co. 99
Morton Mfg. Co. 65
Mulliner Enlund Tool Co. 102
Murchey Machine & Tool Co. 21

N
National Acme Co. 23
National Automatic Tool Co. 17
New Glasgow Machine Co. 67
Nicholson File 28
Niles-Bement-Pond..Inside front cover
Northern Crane Works 80
Norton, A. O. 65
Norton Co. 28
Norton Grinding Co. 59
Nova Scotia Steel & Coal Co. 18

O
Oakley Chemical Co. 94
Oakey & Sons, John 111
Oliver Machinery Co. 93
Page Steel & Wire Co. 95
Pangborn Corporation 95
Parmenter, Bulloch Co. 94
Peerless Machine Co. 18
Perrin, Wm. R. 89
Plewes, Ltd. 65
Positive Clutch & Pulley Works.... 94
Pratt & Whitney....Inside front cover
Prest-O-Lite Co. 74
Publisher's Page 2
Puro Sanitary Drink'g Fountain Co. 64

Q
Quickwork Co. 80

R
Racine Tool & Machine Co. 19
Reed-Prentice Co. 27
Rhodes Mfg. Co. 20
Rochester Ball Bearing Co., Inc..... 94
Rockwell Co., W. S. 94
Roelofson Machine & Tool Co..... 86

S
Seneca Falls Mfg. Company 89
Shipman & Co., Harold C. 65
Shore Instrument & Mfg. Co..... 95
Shuster Co., F. B. 92
Sidney Tool Co. 103
Silver Mfg. Co. 93
Simonds Canada Saw Co. 19
Skinner Chuck Co. 92
Smalley-General Co., Inc. 90
Standard Fuel Engineering Co..... 111
Standard Optical Co. 107
Starrett Co., L. S. 20
Steel Co. of Canada 3
St. Catharines Machinery Co., Ltd. 67
Steinle Turret Machine Co..... 95
St. Lawrence Welding Co., Ltd.... 70
Stoll Co., D. H. 92
Swedish Crucible Steel Co. 71
Swedish Steel & Importing Co..... 67

T
Tabor Mfg. Co. 93
Taylor-Forbes Co. 68
Taylor Instrument Co. 14
Toronto Testing Laboratories 96
Toronto Tool Co. 89
Trahern Pump Co. 88
Turner Brass Works 78

U
Union Mfg. Co. 23
Universal Grinding Machine Co. 71

V
Vanadium-Alloys Steel Co...Front cover
Victoria Foundry Co. 72
Victor Tool Co. 24
Vulcan Crucible Steel Co. 6

W
Walton Co., The 22
Welding & Supplies, Ltd. 70
Wheel Truing Tool Co. 93
Whitman & Barnes Mfg. Co. 17
Whitcomb-Blaisdell Mach. Tool Co.. 82
Whitney Mfg. Co. 68
Wilkinson & Kompass 90
Williams & Co., J. H. 24
Williams Machinery Co., A. R..... 59
Wilson & Co., T. A. 94
Wilson & Co., J. C. 88
Wilt Twist Drill Co. 7
Windsor Machine & Tool Works.... 70
Wood Turret Machine Co. 70
Wright Mfg. Co. 109

Z
Zenith Coal & Steel Products..... 70

QUALITY Foss SERVICE

Foss MACHINERY AND MILL SUPPLIES

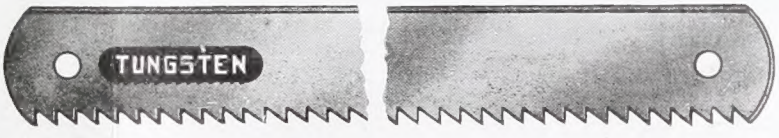
Tungsten
Hack Saw Blades

These TUNGSTEN HACK SAW BLADES have been in operation in the largest cutting-off plants in Canada, working on all classes of steel, iron pipe, aluminum, brass, copper, etc., and have never yet been known to fail. They master all cutting-off difficulties. Efficiency and economy are the two things that every manufacturer is working for to-day, and TUNGSTEN HACK SAW BLADES, from this standpoint, are the best that can be bought.

In ordering blades be sure to specify just what work they are expected to do so that we can furnish a blade that will exactly suit your requirements.

FLEXIBLE BLADES FOR HAND USE

HIGH SPEED HEAVY POWER BLADES
For "Racine" and all heavy duty machines.



Other lines we represent:—

GRAY PLANERS
FRASER GRINDERS
MUELLER RADIAL DRILLS AND GRINDERS
STANDARD BOLT CUTTERS
RACINE MACHINE SAWS
WALLACE BENCH PLANER
KEMPSMITH MILLING MACHINES
SEBASTIAN LATHES
MONARCH LATHES
SLIVERS DRILLS
MOORE BROS.' FILES
ELMIRA WOOD SPLIT PULLEYS
McARTHUR BELTINGS
CHAMPION TOOLS
SWEETLAND CHUCKS
SMITH & MILLS' SHAPERS AND MANY OTHERS

We'll be glad to send you full particulars on any line or lines in which you are interested.

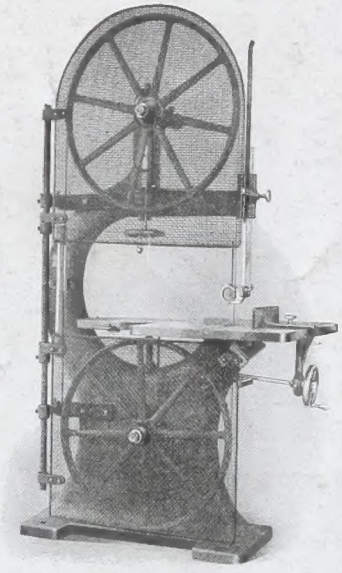
The Geo. F. Foss Machinery & Supply Co., Limited

305 St. James Street Montreal, Que.

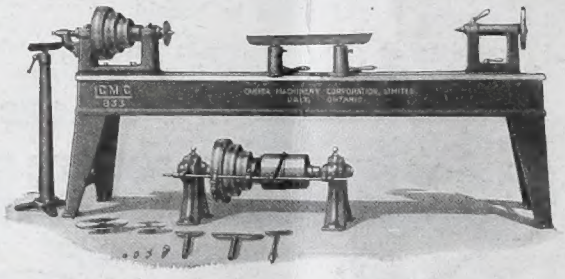
QUALITY Foss SERVICE

C.M.C.

PATTERN SHOP EQUIPMENT

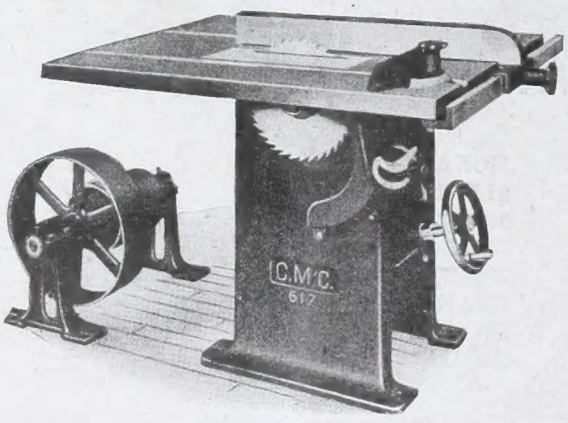


No. 714 Band Saw with guards

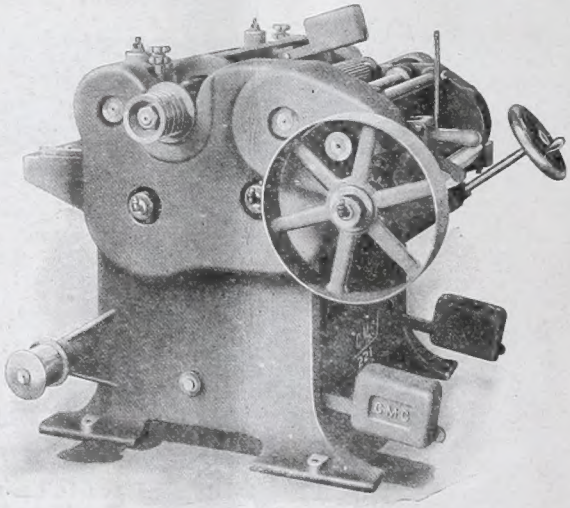


No. 833 Wood Turning Lathe

We manufacture a line of woodworking machines which are specially adapted for use in pattern shops and technical and training schools. We cannot display them all here but would be pleased to furnish you with particulars of any other machines in which you may be interested.



No. 617 Variety Saw



No. 221 Heavy Pony Planer

C.M.C. Machines are guaranteed.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms: Brock Avenue Subway